The Canadian Medical Association Journal

Vol. 62 MARCH, 1950 No. 3

AN INVESTIGATION OF AN OUTBREAK OF STAPHYLOCOCCUS FOLLICULITIS (PEMPHIGUS NEONATORUM) BY THE USE OF BACTERIOPHAGE TYPING OF STAPHYLOCOCCUS PYOGENES

G. D. Denton, M.D.,* G. Kalz, M.D.* and A. R. Foley, M.D.†

Montreal, Que.

FOLLOWING the use of bacteriophage by Fisk[1] in the typing of *Staph. pyogenes* and the further development of this method by Wilson and Atkinson[2, 3] reports have appeared which have stimulated its application to the epidemiological investigation of various categories of infections in which the staphylococcus is the primary etiological agent. Although further development of this procedure is desirable, it presently provides an implement for a reasonably sensitive recognition of types amongst a collection of strains of *Staph. pyogenes.*

The following presentation comprises the results of a study of an extensive outbreak of "pemphigus neonatorum" in a large maternity centre. Unfortunately, the actual onset of the epidemic preceded the initial steps of the investigation by several months. Realizing that with the most careful study it would be highly improbable at such a stage in the progress of the epidemic to uncover the original source of the infection, it was nevertheless considered worthwhile to proceed with the attempt to determine the prevailing types and their distribution within the hospital environment and collect evidence which might indicate the measures necessary to curb the spread of infection.

Source of bacteriophage. — Bacteriophage filtrates accompanied by their individual sensitive propagating strains of *Staph. pyogenes* were kindly provided by Dr. R. T. Fisk.[1] The collection comprised 21 filtrates established by Wilson and Atkinson[2, 3] together with a recently isolated series of ten by Fisk and Mordvin;[4] the specificities of the latter group had not been fully determined. Although there was the possibility of duplication within the second series and even of identity with certain phages of the English material, it was decided nevertheless to utilize all samples in the investigation at hand and consequently an attempt to propagate and prepare lysates of all 31 phages was promptly undertaken.

Propagation and titration of phage.—The procedure for the propagation of the phages as outlined in detail by Wilson and Atkinson[2, 3] was followed without modification. In this manner 24 lysogenic filtrates were obtained and titrated following an average of 12 passages, the highest dilution of each giving confluent lysis of its corresponding susceptible strain of *Staph. pyogenes* being used. The filtrates were placed in sterile screw-capped vials without preservative and kept in the refrigerator. Failure to develop filtrates, after several passages, sufficiently potent to give confluent lysis without dilution occurred in seven and these were not used in this study. Difficulty was encountered particularly with attempted propagation by the plate method.

Method of typing strains. — Each strain of *Staph. pyogenes* to be typed was first grown in 1% glucose broth at 37° C. for four to six hours. Four drops of this young broth culture were deposited on the dried surface of a 9 cm. nutrient agar plate, containing 2% agar and 0.2% glucose, and the inoculum was spread evenly over the entire surface of the agar. The plate was then set aside for five to ten minutes for the surface of the medium to dry. Then each of the 24 phage filtrates was "spotted" at regular intervals over the surface of the plate with a 3 mm. platinum loop. This was best accomplished by making a cardboard "key" the exact size of the plate on which numbered spots were marked, located so as to accommodate the various filtrates used and yet so spaced as to avoid merging of one filtrate into another. The background was made of a

* Department of Bacteriology and Immunology, McGill University, Montreal.

† Provincial Department of Health, Quebec.

contrasting colour to make the numbers clearly visible through the agar plate. In this manner the phage filtrates were "spotted" at constant locations and allowed a clearer comparison of patterns produced by the action of the phages on individual strains.

After each filtrate was applied in this manner, the plate was incubated at 37° C. for six to eight hours and then left at room temperature overnight, after which time lysis by one or more of the phages was clearly apparent. Each of the phage filtrates used was designated by a number from one to twenty-four to facilitate typing.

Specimen Collection and Culturing Procedure

Infants.—By far the majority of the lesions were pustular in character, superficial, varying in size and distribution but involving particularly the axillary folds, neck, scalp, umbilicus and groins. In most cases the lesions were multiple and often appeared superimposed on a diffuse erythema. Most of the severe cases also exhibited a purulent conjunctivitis with or without abscesses, commonly in the axilla or in the buttock. In each case a single pustule was entered with a Pasteur pipette and the sucked-up contents immediately inoculated

Table I.

Action of Phage Filtrates on Strains Isolated from Infected Infants

	Numeration of phage filtrates																						
Types	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*
A	c	c	c	d	c	c	c	c	c	c	c	d	c	c	c	c	c	c	c	c	c	c	c	c
B	o	o	c	o	c	o	o	o	c	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
C	c	o	c	o	c	c	c	c	c	c	c	o	o	s	s	o	c	s	f	o	o	s	c	o
D	o	o	c	o	o	o	o	o	c	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
E	o	o	o	o	o	o	o	o	c	o	c	d	o	o	o	o	o	o	o	o	o	o	o	o
F	o	o	c	o	c	o	o	c	c	s	s	o	o	c	o	o	o	o	o	o	o	o	o	o
G	c	o	c	o	c	o	c	c	c	c	c	d	o	s	s	o	f	f	o	o	o	o	c	o
H	o	o	o	o	c	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
I	c	o	c	o	o	o	o	o	c	o	s	o	o	o	o	o	o	s	s	o	o	o	o	o
J	o	o	c	o	d	o	c	c	c	o	s	o	o	o	o	o	s	f	o	o	o	o	o	o
K	c	o	c	o	c	c	c	c	c	c	c	o	c	c	c	c	c	c	o	o	o	c	o	o
L	c	c	c	o	c	c	c	c	c	c	c	o	c	c	c	o	c	s	f	o	o	c	o	o
M	c	c	c	o	c	c	c	c	c	c	c	d	c	c	c	c	c	c	c	o	c	c	c	o
N	o	o	c	o	f	o	o	o	c	o	s	d	o	o	o	o	o	o	o	o	o	o	o	o
O	c	c	c	o	c	c	c	c	c	c	c	o	c	c	c	c	c	s	f	o	s	c	c	o
P	c	c	c	o	c	c	c	c	c	c	c	o	c	c	c	c	c	c	c	c	o	c	c	c
Q	c	c	c	o	c	c	c	c	c	c	c	d	c	c	c	o	s	s	s	s	c	c	o	o
R	c	o	c	o	c	c	c	c	c	c	c	o	o	c	o	o	c	o	o	o	c	o	o	o
S	o	o	c	o	f	c	c	c	c	o	s	o	o	s	o	o	o	o	o	o	o	o	o	o
T	o	o	c	o	c	c	c	c	c	c	c	o	o	s	o	o	s	f	o	o	o	c	o	o
U	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
V	o	o	c	o	o	o	c	c	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	c
W	c	o	c	o	c	c	c	c	c	f	f	o	s	s	s	o	c	c	c	o	o	c	o	o

The degree of susceptibility of the strain to each of the phages was interpreted by the extent of clearing and recorded as: c = confluent clearing; s = confluent clearing with secondary growth; f = fused areas of clearing; d = discrete areas of clearing; o = no clearing or completely resistant; U = not typable.

Table II.

Correlation of Phage Numbers used to Source Nomenclature

Number	*Nomenclature*	*Source**	*Number*	*Nomenclature*	*Source**
1	3A/284	E	13	51/145	E
2	3B/211	E	14	52/144	E
3	6/3	E	15	4/10A	A
4	7/4	E	16	544/542A	A
5	42B/1163	E	17	534/535A	A
6	42C/1307	E	18	535/535A	A
7	42E/1670	E	19	534/533A	A
8	44A/373	E	20	543/533A	A
9	47/36	E	21	74/76A	A
10	47A/761	E	22	48/62A	A
11	47B/987	E	23	3C/1339	E
12	47C/1163	E	24	47/44A	A

*E: English series, A: American series.

In the nomenclature of each phage, the first number refers to the lysogen and the second to the sensitive propagating strain.

into sodium thioglycollate meat medium and incubated at 37° C. An accompanying requisition form gave necessary information, including the name and age of the infant, the name of the obstetrician and his assistants, the name of the pædiatrician, the date of appearance, location and extent of the first lesions, the nursery location and data relevant to any antibiotic therapy. Nasal swabs of the mother also accompanied the specimen from the infant if the child, at any time since birth, had come in contact with her. If at the time when any specimen was taken the patient had been receiving penicillin or sulfonamide therapy, these were inactivated by the addition of sufficient clarase or para-amino-benzoic acid, as indicated, directly to the primary culture. Specimens from an abscess or conjunctivitis were collected in a similar manner. The specimens were usually collected in the morning and after four to six hours incubation an even mid-zone turbidity of the medium was noted and a loopful of this was then transferred to a blood agar plate, spread and incubated overnight. The following morning a single colony, or if colony characteristics suggested two types, one of each, was taken and transferred to an agar slant, reincubated, identified as a coagulase-positive Staphylococcus and held for typing. With extremely few exceptions each specimen so collected from infected infants revealed a pure growth of *Staph. pyogenes.*

Hospital personnel.—It was evident that in order to assess properly the status of the epidemic it was necessary to ascertain the dimensions of dissemination within the hospital environment including the entire personnel concerned, as well as mothers and infants. Three major groups were attacked; (1) the nursing staff including office nurses, graduate nurses on floor duty and student nurses; (2) attending physicians and intern staff; (3) the laundry staff, although these were maintained in a building completely detached from the hospital proper. It was felt that this should be carried out in the shortest period of time so as to enable us to determine the relative carrier rate of *Staph. pyogenes* within the entire personnel at one time.

All members of each group were subjected to both throat and nasal swabbing and cultures of any obvious lesions that might be harbouring the organisms sought. Using a separate blood agar plate for each, the swab was moistened with glucose broth and spread immediately after the completion of swabbing. The plates were incubated at 37° C. for two consecutive 24 hour periods, single colonies being picked and transferred to plain agar slants for identification and typing. The entire personnel was cultured in this manner well within a three-week period.

Maternity hospital environment.—In addition to culturing the personnel, blood agar plates were left exposed to the air for a four-hour period in each nursery. Two plates were exposed in each nursery, one amidst the bassinets and another on the dressing table. After exposure the plates were again covered and incubated at 37° C. for 24 hours and then left at room temperature overnight. The number of colonies per plate were counted and at least two-thirds of them typed.

Additional laboratory procedures.—In addition to typing, each strain of *Staph. pyogenes* isolated from any source pertaining to the investigation was examined with regard to lactose and mannite fermentation, pigment production, degree of hæmolysis produced and penicillin sensitivity. Fermentation of lactose or mannite only after five full days' incubation at 37° C. was considered late. The remaining three characteristics of each strain were determined by placing a disc impregnated with five units of penicillin-G firmly in the centre of a blood agar plate and making a single streak of each strain to be tested in radial fashion from the periphery of the plate up to the disc in the centre, and then incubating at 37° C. overnight. By using this method, five strains, on the average, could be tested per plate. The following morning penicillin sensitivity and degree of hæmolysis was noted and following a further 24 hour period of incubation at 20° C. the colour of the strain also recorded.

Epidemiological study. — As already mentioned, the outbreak of pemphigus neonatorum in the institution preceded the present investigation by several months. By midsummer the epidemic character was definitely established and the increased attention to routine precautions did not seem sufficient to stop the spread. The report by Allison and Hobbs[5] just at this time stimulated the clinicians to ask the laboratory for co-operation in the hope of find-

ing the source of the epidemic and devising some means of stopping it. It is estimated from the hospital records that 2,007 infants were born in the institution during the epidemic period under observation. The number of infants who suffered from folliculitis cannot be established, but it is not an understatement to say that the disease had been prevalent in the centre for over 18 months. But the period of our study is more restricted and covers only from the last week of September, 1947, to the second week of May, 1948. However, this sampling of the epidemic does not affect the value of our study; the conditions observed in the last months of 1947 were the same as in the previous months and the number of cases studied may be assumed to be a fair sample of the total number of cases of the outbreak. Nevertheless, it is here stated that the findings and discussion hereafter presented apply only to the cases and period under observation.

EPIDEMIOLOGICAL FINDINGS

In infants.—The Maternity Centre includes six departments which are named respectively according to their location in the hospital: "1 West", "2 East", "2 West", "3 East", "4 East" and "Premature Nursery".

From the beginning it became apparent that the disease was prevalent in each of the nurseries, with the exception of the Premature Nursery, where the disease first appeared in December. In October there had been a prevalence in "2 East", "3 East" and "4 East".

The number of cases, or rather specimens collected, was constantly smaller in "2 West", though this nursery was about the same size and had about the same baby population as the others, but there was a poor collection of samples. Only "1 West" nursery carried a smaller population, averaging 1/4 or 1/3 that of the others. The results may be due to chance, but owing to the small population it is probable that the infection may really have been of a lesser importance.

The following Table III gives a clear picture of our observations during the eight months of the study.

During the eight months from September, 1947 to May, 1948, 137 cases of folliculitis were cultured and in all but four *Staph. pyogenes* was isolated. A glance at the table shows a

TABLE III.

PHAGE-TYPES OF STAPHYLOCOCCUS PYOGENES STRAINS ISOLATED FROM SICK INFANTS BY TIME AND LOCATION

Year	*1947*				*1948*					*Total*	
Month	*Sept.*	*Oct.*	*Nov.*	*Dec.*	*Jan.*	*Feb.*	*March*	*April*	*May*	*Strain A*	*All Strains*
Week	*4*	*1 2 3 4*	*1 2 3 4*	*1 2 3 4*	*1 2 3 4*	*1 2 3 4*	*1 2 3 4*	*1 2 3 4*	*1 2*		
Place 1 W	B B	B	X		A	A U	S A	A A A A N	A A A	10	16
2 E		A A A E E A A		A G	A A A A A A A A	A A A P	A A A A A	A A A A A		27	31
2 W		A	A A		A A	NO R	A B V D	X		6	12
3 E		A A A A A A H	A A A X A A X A A A B	C A A A A A	A A A A A A A A C K C L M	A D	A A A A DA B	A		34	45
P.N.				A A		A A A A A A Q	A T A	T W W		10	15
4 E		A F F A I A U C B	B		J A			W	U	4	14
Total.....	2	25	12	10	26	18	21	15	4	91	133

X = Clinically typical cases but organism not isolated due to premature application of local antiseptic.

continuous distribution of cases in each of the nurseries and a large variety of phage types. This latter point will be emphasized later on when a comparative study is made of the type distribution in patients and controls. However, it is to be noted that there is a predominance of Type A organisms, in each nursery and throughout the whole period. In nursery "1 West", out of 16 staphylococcus cultures 10 were of Type A; in "2 East", 27 out of 31; 6 out of 12 in "2 West"; 34 out of 45 in "3 East"; 10 out of 15 in the Premature Nursery and 4 out of 14 in "4 East". Out of the 133 cultures, 91, or 68.4% were of Type A, that is, two-thirds of the samples.

The distribution of cases for the Maternity Centre as a whole indicates that the investigation began when the epidemic was raging; a decrease in the incidence followed during the months of November and December and there was a new flare-up during the winter months, January, February, March and April, to subside at the end of our study, though it is known that cases were still occurring in the Maternity Centre during the summer months of 1948.

Thus, when Table III is taken as a whole, at a glance it strikes the reader that cases have been prevalent in each nursery during the whole period of study, and that Type A is the predominant organism. It follows then that these new-born children were contaminated in their environment.

It was decided to culture the hospital personnel and to take a group of controls not directly connected with the Maternity Centre, but connected with the University and a second group of controls living completely outside of the University. The laboratory findings are

TABLE IV.
FREQUENCY OF DIFFERENT STAPHYLOCOCCUS TYPES AND LABORATORY FINDINGS IN MATERNITY CENTRE

Population	*Infants*	*Mothers*	*Doctors*	*M.S.4**	*Nurses*	*Laundry*	*Total*
Population	2007	1991	48	50	94	16	4206
No. cultured	137	50	28	50	94	16	375
No. positive	133	10	8	23	60	6	240
Nasal		10	8	23	56	6	103
Throat		0	0	0	4	0	4
Phage types							
A	91	4	2	9	12	1	119
B	8		2	1	6		17
C	4						4
D	3			1	1		5
E	2						2
F	2						2
G	1						1
H	1						1
I	1						1
J	1						1
K	1						1
L	1						1
M	1						1
N	2						2
O	1						1
P	1						1
Q	1						1
R	1						1
S	1						1
T	2			1	1		4
U	3	2	2	5	14	3	29
V	1						1
W	3						3
Unrel.		4	2	6	26	2	40
Penicillin-S	93	10	4	21	32	5	165
Penicillin-R	40	0	4	2	28	1	75
Hæmolytic	124	10	6	22	58	6	226
Non-hæmolytic	9	0	2	1	2	0	14
Late lactose	1	0	0	1	6	0	8
Late mannite	9	0	0	2	3	0	14
Orange	103	7	6	18	39	3	176
Yellow	10	0	0	0	1	0	11
White	20	3	2	5	20	3	53

*4th year medical students.
Penicillin-S = penicillin sensitive.
Penicillin-R = penicillin resistant.

given in Tables IV and V and the epidemiological summation is shown in Table VI.

MATERNITY CENTRE

The first line of figures in Table IV, entitled "Population", represents the number of persons who lived or worked in or for the Maternity Centre during the period of the investigation, but, of course, only the infants and mothers who were in the Centre when the investigation began could be cultured. Of the 48 doctors, 20 were not cultured because they

TABLE V.

FREQUENCY OF DIFFERENT STAPHYLOCOCCUS TYPES AND LABORATORY FINDINGS IN MCGILL UNIVERSITY CONTROLS AND IN CITY HEALTH DEPARTMENT CONTROLS.

Populations	*P.G.N.*	*N.N.*	*S.N.*	*MS-2*	*P.Ed.*	*Sc.-1*	*Int.*	*PHN*	*Total*
Population	50	120	50	50	70	59	25	60	484
No. cultured	50	120	50	50	70	59	25	60	484
No. positive	12	52	11	10	18	8	9	19	139
Nasal	10	41	11	10	18	8	9	17	124
Throat	2	11	0	0	0	0	0	2	15
Phage types									
A	2	16	1		9	6	1	8	43
B		13					1	2	16
C									0
D	1	4		1			1	1	9
E									0
F									0
G									0
H				2					2
I									0
J									0
K									0
L							1		1
M									0
N	2	3	1				1		7
O									0
P									0
Q									0
R									0
S									0
T	1				2				3
U	2	7	2	3	1	2	1	2	20
V									0
W									0
Unrel.	4	9	7	4	6	0	3	6	39
Penicillin-S	8	18	9	10	15	8	6	17	91
Penicillin-R	4	34	2	0	3	0	3	2	48
Hæmolytic	8	47	11	10	18	5	9	17	125
Non-hæmolytic	4	5	0	0	0	3	0	2	14
Late lactose	1	1	0	1	0	0	0	0	3
Late mannite	0	0	1	1	1	0	0	0	3
Orange	8	43	9	9	13	3	8	14	107
Yellow	3	6	0	0	1	3	0	2	15
White	1	3	2	1	4	2	1	3	17

P.G.N.: Post-graduate Nurses Class.
N.N. : New Nurses.
S.N. : Student Nurses.
MS-2 : 2nd Year Medical Students.
P.Ed. : Physical Education.
Sc-1 : 1st Year Science Students.
Int. : Interns.
PHN : Public Health Nurses.

TABLE VI.

SUMMARY OF STAPHYLOCOCCUS TYPES DISTRIBUTION IN INFANTS, MATERNITY CENTRE AND CONTROLS

	Infants			*Maternity centre*			*Controls*		
Types	*No. cult.*	*No. pos.*	*%*	*No. cult.*	*No. pos.*	*%*	*No. cult.*	*No. pos.*	*%*
All types	137	133	97.1	238	107	44.9	484	139	28.7
Type A	133	91	68.4	107	28	26.2	139	43	30.9
B	133	8	6.0	107	9	8.4	139	16	11.5
D	133	3	2.2	107	2	1.9	139	8	5.7
U*	133	3	2.2	107	26	24.3	139	20	14.3
Unrelated	133	0	0.0	107	40	37.4	139	39	28.0

*This represents strain which could not be typed with available phages.

presided at only one or two deliveries during the whole period.

The salient points of Table IV are as follows: (1) The incidence of infection is much higher in the infants than in the mothers or personnel. (2) The frequency distribution of types is different in infants from that of their mothers or the personnel; all the types have been found in the infants, when in the mothers only A, B, D, T, U (not typable) and Unrelated were found. (3) The predominant type in the infants is A and the same type has been found in each of the other groups of personnel. These observations may be summed up thus: staphylococcal infection was prevalent in the Maternity Centre; the infants, being more vulnerable, developed the disease, and the personnel, being more resistant, became carriers; of the 22 phage types Type A was predominant, as seen in Table IV. It should be added that one or more of the permanent nurses in each of the nurseries was found to be a carrier of Type A, which is significant in view of the relatively low percentage of Type A in the nurses as a whole.

TABLE VII.

Group	*No. positive*	*No. type A*	*% type A*
Infants	133	91	68.4
Mothers	10	4	40.0
Doctors	8	2	25.0
M.S.–4	23	9	39.1
Nurses	60	12	20.0
Laundry	6	1	16.7
Total	240	119	49.7

Controls.—Nine groups of persons were chosen as controls, one of which, the public health nurses of the City of Montreal, were not living and working in the hospital or the university. In the Maternity Centre 375 persons were cultured and 240, or 64.0% were positive and 119 or 31.7% were Type A. In the control, 484 persons were cultured and 139 or 28.7% were positive, and 43 persons or 8.9% were Type A. The differences between the two groups are significant. In addition, in the control groups, there is a scattering of the different phage types and Type A cannot be said to be the dominant type in them. It would also appear significant that among the group of fifty 4th year medical students, all of whom had spent at least a period of two weeks training in the Maternity Centre during the epidemic period, 23 or 46% were nasal carriers and 9 carried the Type A strain, whereas the 2nd year medical students who had never been in the Maternity Centre had only a 20% general carrier rate with no Type A strains.

EPIDEMIOLOGICAL SUMMATION

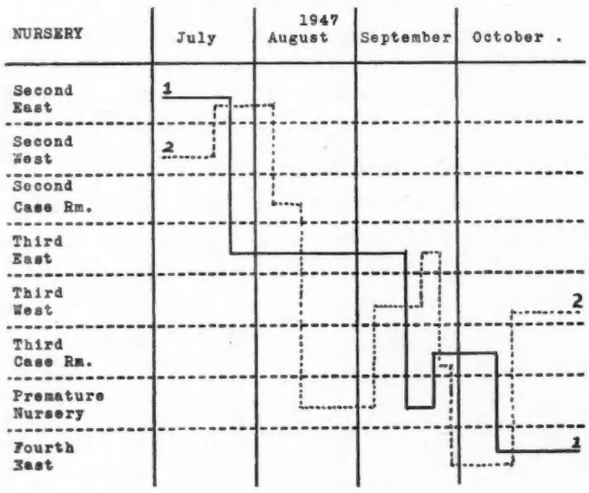
From Table VI, a condensation of the data, it becomes evident that a staphylococcal infection occurred in the infants, that the prevalence of carriers was high in the Maternity Centre and the controls establish there was a moderate incidence of the organism in the general population. The epidemic was caused by Type A, though all the other types were recovered in the infants; but the presence of Type A in the controls leads us to believe that though the general population may have been the seed of the epidemic, it developed in a favourable soil with establishment of local carriers.

But, how was the infection spread? It has already been established that the infants were contaminated in their environment. The transmission of the infecting agent may have been by direct contact between an infant and a carrier, or indirectly by air-borne transmission of the organism.

A. *Direct contact infection.*—The source of infection may have been the mothers of the infants, the doctors in attendance, the 4th year medical students on service, the nursing staff or the laundry personnel; but it is not possible to establish beyond doubt which one of these groups was really the source of the staphylococcal infection. However, it is easier to point out which group had the greatest facilities of spreading the infection after it had been introduced. The chance of the mothers being the mode of transmission is small, as they are confined to bed or to their rooms and the incidence of the staphylococcus, especially the epidemic strain, was low in the mothers; each doctor will see only the mother or infant of whom he is in charge and only 2 out of 28 were phage Type A positive; the same applies to the medical students who will visit mothers and infants only occasionally; the laundry personnel has no direct contact with the infants and it is not probable that washed and pressed linen would be so grossly contaminated by this personnel for it to be the mode of transmission of the infection. On the other hand, the nurs-

ing group, by the nature of their work, took daily care of the infants, night and day, and was the most probable and the most direct mode of transmission. Out of 94 nurses, 60 had a positive culture for *Staph. pyogenes* and 12 were Type A. Thus many of this group were carriers and had the opportunity to transmit the causal organism. In addition, there is a constant rotation of nurses from one service to another, especially of student nurses, for purposes of teaching and practical training. We give as an example, in Table VIII, the rotation of two student nurses through the

TABLE VIII.
ROTATION OF TWO STUDENT NURSES THROUGH THE MATERNITY CENTRE



Maternity Centre, during a period of four months. This movement of nurses through the successive nurseries constitutes a danger of propagation of infection, and has possibly helped to keep the outbreak alive in all the nurseries for so long a period of time. It is significant that in each nursery involved there was a Type A carrier permanent nurse and there were Type A carriers among nurses moving through the various nurseries.

B. *Airborne infection.*—The theory of infection through fomites, which was abandoned in the early days of bacteriology, is now finding new adherents and airborne transmission of infections cannot now be disregarded. Blood agar plates were exposed in each nursery, and the number of colonies per plate were counted and typed when possible with the results shown in Table IX. *Staph. pyogenes* was isolated from each nursery on the air plates and in each nursery there was a variety of phage types of which Type A was predominant. The total number of colonies in the six nurseries was 63; of these 44 were phage-typed and 20 were Type A, that is one-third of the total number of colonies and nearly half of those that were typed were Type A *Staph. pyogenes.*

A plate exposure was made in one of the medical wards completely detached from the Maternity Division and only two staphylococcus colonies were found and they were of the "Unrelated" variety. One must admit that the air of the nurseries was contaminated and the contamination occurred with the dominant A type. The air of the rooms, laden with organisms by the carriers and infected infants may have been a vehicle to the staphylococcus and some of the infection of the infants may have been airborne.

DISCUSSION AND CONCLUSIONS

The minimum incidence of infection among the infant population during the period under observation was 6.8%. It is well known that sporadic cases of staphylococcus infection among infants in a maternity centre do occur. When the number of cases becomes elevated to epidemic proportions, it becomes a grave concern for both the obstetrician and pædiatrician alike; not that the life of the infant is jeopardized, for fatalities are unusual. Such infection not only prolongs the infant's hospitalization but tends to persist for three to five months and impedes normal progress and development. It was for this reason primarily, that this investigation was undertaken at the request of the Maternity Staff, and such circumstance might well occur in any maternity centre. Recently a similar epidemic was reported by McGuinness and Musgrove[6] and this report was a further stimulus for us to publish the results of our own investigation.

As a result of this study we feel that the bacteriophage typing of *Staph. pyogenes* is an extremely useful measure in attacking such a problem. During our study it was evident that there was no correlation between a strain's phage type and its susceptibility to penicillin, its production of hæmolysis, its fermentation of lactose and mannite, or its pigmentation. It may however be of interest that of the 379 strains isolated, 123 (32.5%) were resistant to 5 units of pencillin *in vitro,* and of the strains isolated from the infected infants 30% fell into this

category. A significant number of strains isolated were tested for hyaluronidase production by Professor R. G. E. Murray and no correlation between this and the phage type was demonstrated.

In considering the control series, as outlined in Table V, it is noted that amongst the group labelled "new nurses" the carrier rate is somewhat high, being 43.3%. These individuals represent nurses commencing duty in the Maternity Centre for the first time. Although cultures were taken prior to their entrance into the epidemic environment, in most cases they shared the same quarters as the nursing staff already engaged in the Maternity Division and in this respect do not, perhaps, serve as an accurate control unit. The remainder of the controls consisted of a postgraduate nurses class, first year student nurses not yet introduced to any hospital training, second year medical students, physical education class, first year science students, and intern staff, and none of these were associated with the Maternity Division. In addition, public health nurses from six widely separated localities completely outside the university and hospital served as the final control group, and with purpose to sample the incidence of Type A in the City of Montreal at large.

It is interesting to note that the nasal carrier is predominant in both the Maternity Centre and the control group. The work of Miles, Williams, and Clayton-Cooper[7] on the carriage of *Staph. pyogenes* in man has shown that the nose is the primary source of *Staph. pyogenes* found on the hands and that in their series of 479 cases, 24.7% of nasal carriers were skin carriers and the percentage of skin carriers among those not carrying the organism in the nose was only 12%. They also established that the carriage of *Staph. pyogenes* in the nose is for the most part a persistent phenomenon, or at least if the person is found to be a carrier on a given date, there is a 70 to 75% probability of his carrying the organism within 14 days of the date of swabbing. With these facts in mind it is not difficult to understand how a particularly virulent strain of *Staph. pyogenes,* if once introduced into fertile soil such as a large infant population, can soon produce an epidemic. Moreover it is reasonable to predict that such an epidemic once it is firmly established, will tend to persist for a considerable time, until it either dies out spontaneously or heroic measures are enforced to curb it. We feel, however, that if such an epidemic due to *Staph. pyogenes* can be attacked during the early stages of develop-

TABLE IX.

AIRBORNE STAPHYLOCOCCUS PYOGENES FOUND IN THE NURSERIES

Nursery	*Date of exposure*	*Average population*	*Total number of colonies*	*Number of colonies typed*	*Phage types recovered*								
					A	*B*	*N*	*O*	*P*	*T*	*U*	*W*	*Unrel.*
1 W	April 14	2–5	D.T. – 9 Bas. – 8 —17	4 4	1 2	1 1		1			1 1		
2 W	April 9	15–18	D.T. – 1 Bas. – 0 — 1	1 0	1								
2 E	April 14	12–15	D.T. –15 Bas. – 3 —18	8 3	4 1						1 1	1	3
3 E	April 9	15	D.T. –19 Bas. – 6 —25	16 6	9		3		1	2 3	1 2		1
P.N.	April 14	2–5	D.T. – 0 Bas. – 1 — 1	0 1	1								
4 E	May 12	10–15	D.T. – 0 Bas. – 1 — 1	1									
Total		56–73	63	44	20	2	3	1	1	5	7	1	4
Wd. A Main	May 12	30	2	2									2

D.T. = Dressing table.
Bas. = Bassinets.

ment, the bacteriophage typing of this organism is a valuable tool in the investigation of its source and might indicate measures to control it.

SUMMARY

1. An outbreak of "pemphigus neonatorum" occurred in a large hospital.

2. The onset of the epidemic preceded the investigation by several months.

3. A study was made of the extent of dissemination of *Staph. pyogenes* phage types in the environment.

4. The source of bacteriophage, its propagation and titration as well as the method of typing strains with it are described.

5. Cultures were made from sick infants and the hospital personnel and the strains isolated were typed.

6. Additional criteria differentiating the strains isolated were not informative in relation to the epidemic.

7. The period of study covers part only (eight months) of the epidemic wave which affected six nurseries; the 133 infants with positive cultures represent a significant sample of the total number sick from folliculitis.

8. The infection was prevalent in the Maternity Centre; mothers, doctors, medical students, nurses and laundry personnel were found to be carriers of the Type A organism, responsible for the outbreak.

9. Controls were examined and the general carrier rate, as well as that of the epidemic type, is significantly lower than that found in the Maternity Centre.

10. The causal organism was a *Staph. pyogenes* of phage type A, but a large variety of other types was identified.

11. Direct contact infection by carriers is the most probable route of infection of the infants and nurse carriers are the most likely source. Airborne infection derived from both carrier and infected infant is also a possibility.

12. From the incidence observed it is permissible to suggest that the mothers were more likely to have been infected from the infants rather than the other way round.

We take great pleasure in having the opportunity to thank Dr. R. T. Fisk, University of Southern California, for his great kindness in supplying us with the typing bacteriophage lysates and propagating strains.

We also wish to thank the Staff of the Montreal Maternity Hospital for their helpful co-operation. Our thanks are due to Professor R. G. E. Murray for the testing of hyaluronidase production and to Professor E. G. D. Murray for many helpful suggestions.

REFERENCES

1. FISK, R. T.: *J. Infect. Dis.*, 71: 153, 161, 1942.
2. WILSON, G. S. AND ATKINSON, J. D.: *Lancet*, p. 19, May 20, 1945.
3. *Idem*: *Lancet*, p. 647, May 26, 1945.
4. FISK, R. T. AND MORDVIN, D. E.: Personal communication.
5. ALLISON, V. D. AND HOBBS, B. C.: *Brit. M. J.*, p. 1, July 5, 1947.
6. MCGUINNESS, F. G. AND MUSGROVE, G. S.: *Canad. M. A. J.*, 61: 356, 1949.
7. MILES, A. A., WILLIAMS, R. E. O. AND CLAYTON-COOPER, B.: *J. Path. & Bact.*, 56: 513, 1944.

WELL WATER METHÆMOGLOBINÆMIA IN INFANTS*

Harry Medovy, B.A., M.D.

Lecturer in Pædiatrics, University of Manitoba, Pædiatrician in Chief, Winnipeg General Hospital, Senior Attending Physician, Children's Hospital, Winnipeg, Man.

CONTINUOUS cyanosis in a baby in the first few weeks of life has usually meant one of three things to the attending physician. Firstly, congenital heart disease. Secondly, respiratory tract disease due either to congenital malformation, obstruction or infection. Thirdly, in the case of a few die-hards the diagnosis of "enlarged thymus" has been made not infrequently. Within the last four years another diagnostic possibility has been added to this triad, namely cyanosis due to the ingestion of well water of high nitrate content, a condition referred to hereafter as well-water methæmoglobinæmia.

This is a disease of the artificially fed rural infant. There seems little doubt that it is not a new disease although it is possible that it has become more prevalent of late. Many of these infants must have been labelled "congenital heart disease" or "enlarged thymus" in the past. Most of them recovered spontaneously in the course of a few weeks. Some of them died and were probably listed as cardiac or thymic deaths.

The first cases were reported from Iowa by Comly in 1945.[1] Shortly thereafter cases were reported from Kansas[2] and Belgium[3] and the first Canadian cases were reported from Manitoba and Ontario in 1947.[4, 5, 6] The first Saskatchewan case was reported by Goluboff[7] of Saskatoon in 1948.

In every reported case the story is the same. The patient is always an infant eight weeks old or less, residing in a rural area. The birth history is normal and the infant progresses normally so long as it is breast fed. At the age of

* Read before the Eighteenth Annual Meeting of the Canadian Medical Association, Saskatoon, Section of Pædiatrics, June 16, 1949.

3 or 4 weeks the infant is weaned because of an inadequate breast milk supply. A formula of evaporated milk is then given. The water used in the preparation of this formula is obtained from the nearby well. Within a few days the parents realize the baby is cyanosed. This cyanosis is continuous and gradually increases in intensity day by day. The baby becomes apathetic, listless and may have attacks of syncope. Careful examination by the doctor reveals no evidence of disease of the heart or lungs. X-rays are negative. If a sample of blood is drawn from the infant, it is found to be chocolate coloured. Spectroscopic examination of this blood shows a well-marked methæmoglobin band. If a sample of the water used in the preparation of the baby's feeding is examined, it is found to have a nitrate content of 100 to 300 parts per million, a figure well above the 10 parts per million considered to be a safe upper limit. The diagnosis of well water methæmoglobinæmia having been made, water of known purity is at once substituted in the formula. Within 24 hours the baby is well and remains well.

How commonly does well water methæmoglobinæmia occur? Within the last two years there have been 154 cases including 12 deaths in Minnesota; 33 cases with 8 deaths in Illinois; 68 cases in Iowa. The author has seen or treated in consultation by telephone some 15 cases in Manitoba, Western Ontario and Eastern Saskatchewan. Well water methæmoglobinæmia is not a reportable disease; these figures consequently do not begin to tell the whole story. It is obvious, however, that for the Northwest United States and for Western Canada at least, this condition deserves the immediate attention of physicians and public health bodies.

How does well water of high nitrate content harm the artificially fed baby? The nitrate ingested in the baby's formula is converted to nitrite in the upper gastro-intestinal tract by bacterial action. According to Cornblath and Hartmann[7] these nitrite-producing bacteria can exist, in large numbers, high up in the gastro-intestinal tract in infants in the first few weeks because of the low gastric acidity which prevails in early infancy (pH 4.0 or higher.) Nitrite upon absorption into the blood converts functioning hæmoglobin into methæmoglobin, an inert form of hæmoglobin which is unable to carry oxygen. If the methæmoglobin rises to a level of 3 gm. or higher the oxygen carrying capacity of the blood is interfered with to such an extent that visible cyanosis occurs and the baby becomes listless and apathetic. Substitution of low nitrate water (10 p.p.m. or less) results in recovery within 24 hours since the normal mechanism within the red blood cell tends to convert methæmoglobin back to hæmoglobin. This process of conversion to hæmoglobin is greatly hastened by the use of methylene blue.

The diagnosis of well water methæmoglobinæmia should present no difficulties. Every cyanotic rural infant under two months of age who is artificially fed should be regarded as a case of well water methæmoglobinæmia. Simple substitution of water of known purity in the formula will result in cure within 24 hours. The diagnosis of congenital heart disease in the absence of a cardiac murmur should not be made until this diagnostic test is carried out. If there are still some who believe that cyanosis in an infant can be due to the thymus gland the following case record may be of interest.

A 5-week baby was referred to a city radiologist for x-radiation of the thymus because of cyanosis. The baby came from a rural point some 200 miles from the city. A roentgenogram of the chest revealed nothing abnormal but in view of the accompanying instructions, radiation was given. The baby stayed in a city hotel and its formula was of course prepared with city water. The day following radiation treatment the cyanosis had disappeared and the innocent radiologist was the recipient of profuse parental thanks for the miraculous cure. Had the infant not returned home a few days later this case might have gone into the records as a case of x-ray cure of thymic cyanosis. However, this infant did return home and within 24 hours was cyanosed again. When water from the town supply was substituted in the formula, complete and permanent disappearance of the cyanosis occurred. The suspected well had a nitrate content of 350 parts per million.

Can the well water be rendered safe by boiling? The answer is a definite *No*. Boiling water of high nitrate content will only increase the concentration of nitrate and as in a case recorded in the files of the Minnesota Department of Health may cause death of the baby.

Is a well containing a high content of nitrate necessarily a contaminated one? The answer is *No*. In the Saskatchewan report[9] most but not all the high nitrate wells were also contaminated. In the Illinois survey[10] no correlation was found between the presence of high nitrate content and bacterial contamination of the well. Because many of the wells were poorly constructed and all of them shallow, many did contain excessive numbers of coliform organisms. However, a significant number of wells of satisfactory sani-

tary rating had a very high nitrate content. Weart's survey comprised a study of more than 7,000 private wells in all sections of Illinois.

It is our impression that the problem of well water methæmoglobinæmia is directly related to high nitrate content of soil in scattered areas of the great western plain. Nitrates are very soluble and move freely with soil moisture. In this way shallow wells in an area where there is high concentration of nitrate in the soil soon became contaminated with a high content of nitrate. It is interesting that in Manitoba deaths have occurred among cattle feeding on oat hay, and in one instance nine cattle died of methæmoglobinæmia after a feed of sugar beet tops which were later found to have many times the normal nitrate content. Perhaps this is what inspired Gelett Burgess to write:

> "I never saw a purple cow
> I never hope to see one
> But, I can tell you, anyhow,
> I'd rather see than be one."

TREATMENT

Prompt diagnosis is the most important part of treatment. Most cases of methæmoglobinæmia will recover spontaneously within 24 hours if the formula is remade using water of known purity. Not one of the cases I have seen have required anything more. Many, perhaps all, of the cases reported in the literature as recovering within a few hours of being treated with ascorbic acid would probably have cleared up spontaneously, since in every case the water in the formula was changed at the same time the ascorbic acid treatment was instituted. For the severe cases methylene blue is life saving; ½ c.c. of 1% methylene blue injected intravenously in an 8 lb. infant will bring about recovery within half an hour or less. An emergency supply of this drug should be available in every hospital and in every rural doctor's dispensary.

PREVENTION

Well water methæmoglobinæmia would not occur if all babies were completely breast fed in their first eight weeks. Since this ideal is not likely to be attained measures must be taken to protect the artificially fed infant. Steps must be taken to ensure that before a rural baby is offered artificial feeding, the well water to be used in the feeding is examined for nitrate content and only water containing 10 parts per million or less nitrate be certified as safe formula water. Should the situation arise where the only available water in the area has a high nitrate content, then formulæ must be used containing as little water as possible. Obviously the most dangerous formulæ are those containing the most water. Thus powdered milks would be the least desirable, and acidified undiluted cows' milk the most desirable of the artificial foods.

Public health bodies in Western Canada have a real responsibility in handling the problem of well water methæmoglobinæmia, and unless prompt and adequate measures are taken more deaths will occur. This condition must be made a reportable disease so that its actual incidence may be known. The public should be made familiar with the dangers of high nitrate well water by newspaper and radio information prepared by provincial health departments. The nursing and medical profession should be informed by lectures and journal articles. Testing of a well for nitrate content should become a recognized part of rural pre-natal care.

SUMMARY

1. Cyanosis in an artificially fed rural infant under 8 weeks of age is commonly due to well water methæmoglobinæmia.

2. Simple substitution of water of known purity in the feeding formula will make the diagnosis and will usually bring about a complete cure.

3. Examination of well water for nitrate content should be made an important part of the rural pre-natal examination.

4. The physician, the soil scientist, the veterinarian and the public health expert should combine forces in conducting investigation into the factors involved in the occurrence of high nitrate soil and wells.

5. Breast feeding should be encouraged for the rural infant as an important measure in the prevention of well water methæmoglobinæmia.

6. Well water methæmoglobinæmia should be made a reportable disease.

REFERENCES

1. COMLY, H. H.: *J.A.M.A.*, **129**: 112, 1945.
2. FAUCETT, R. L. AND MILLER, H. C.: *J. Pediat.*, **29**: 593, 1946.
3. FERRANT, M.: *J. Pediat.*, **29**: 585, 1946.
4. MEDOVY, H., GUEST, W. C. AND VICTOR, M.: *Canad. M. A. J.*, **56**: 505, 1947.
5. *Idem*: *Journal-Lancet*, **68**: 194, 1948.
6. *Idem*: *Mod. Concepts of Cardiovascular Disease*, **17**: No. 10, October, 1948.
7. GOLUBOFF, M.: *Canad. M. A. J.*, **58**: 601, 1948.
8. CORNBLATH, M. AND HARTMAN, A. F.: *J. Pediat.*, **33**: 421, 1948.
9. ROBERTSON, H. E. AND RIDDELL, A. W.: *Canad. J. Pub. Health*, **40**: 2, 1949.
10. WEART, J. G.: High Nitrate Waters, Their Occurrence, Source and Significance. (Presented before American Chemical Society 1948).

PARA-AMINOSALICYLIC ACID WITH STREPTOMYCIN IN TUBERCULOSIS*

W. Anderson, M.B., Ch.B.,
M. G. W. Jansen, M.D. and
C. A. Wicks, B.A., M.D.

Weston, Ont.

THIS is a preliminary report upon the clinical and laboratory findings at the Toronto Hospital for Tuberculosis, Weston, in a group of patients receiving concomitantly para-aminosalicylic acid (P.A.S.) orally and streptomycin intramuscularly for pulmonary tuberculosis.

Following the interest of Dr. J. C. McClelland, Consultant in Urology, in chaulmoogra oil with streptomycin for renal tuberculosis, the possibilities of combined therapy were discussed with Dr. Philip Greey, Professor of Bacteriology, University of Toronto. After consultations with Merck and Co., Dr. Greey suggested that we investigate the value of P.A.S. in conjunction with streptomycin. The study began in March, 1948, and is continuing.

The early work with P.A.S. as an agent inhibitory to the growth of tubercle bacilli *in vitro* has been reported by others in the literature[1, 2] and will not be further elaborated upon here. Recently, others have made preliminary reports[5, 7] upon the therapeutic and laboratory results of giving P.A.S. in addition to streptomycin to patients under treatment for tuberculosis. These workers report slight, if any, enhanced clinical response from such combined treatment, but draw attention to a delay in the emergence of streptomycin resistant strains of tubercle bacilli among those receiving combined streptomycin and P.A.S. therapy.

In the study being reported, all patients receiving "combined" therapy were placed upon 10 gm. of P.A.S. daily by mouth, or its equivalent as the sodium salt of para-aminosalicylic acid, in addition to 1.0 gm. of streptomycin intramuscularly daily in two equally divided doses. At the beginning of this study, the P.A.S. received in powder form was administered in capsules containing 0.2 gm. of P.A.S. per capsule. Patients received 10 capsules five times daily or a total of 50 capsules containing 10 gm. of P.A.S. daily. Later, a 10% aqueous solution of the sodium salt of P.A.S. was prepared from the P.A.S. powder supplied. This solution was made by adding 120 gm. of sodium bicarbonate to 200 gm. of P.A.S. To this was added 150 c.c. of fluid extract of liquorice, or alternatively, 10 minims of methyl salicylate. In both preparations, solutions were made up to 2,000 c.c. with distilled water. In this manner, solutions of the sodium salt of P.A.S. flavoured with either liquorice or oil of wintergreen were prepared so that 100 c.c. contained the equivalent of 10 gm. of P.A.S. Patients elected to receive one or the other flavouring but all were given 100 c.c. of either solution daily by mouth in three divided doses.

Originally in this study it was desired to determine if the concurrent administration of P.A.S. enhanced the clinical results obtained from the use of streptomycin alone. Alternate patients with exudative tuberculosis considered suitable for treatment with streptomycin were also given P.A.S. The first section of this paper, "Clinical", will deal with the above mentioned cases. The second section of this paper, "Laboratory" will deal with the streptomycin sensitivity of the tubercle bacilli recovered from those patients who received "combined" therapy. To provide material for this latter section (to provide sources of sputum from which tubercle bacilli could be isolated during and after treatment), a number of patients with chronic fibrocaseous pulmonary tuberculosis were given streptomycin and P.A.S.

CLINICAL

For the comparison of clinical results among patients treated by sanatorium routine, streptomycin and P.A.S. as compared with those receiving sanatorium routine and streptomycin, we have eliminated those who received any other concurrent treatment such as collapse therapy. Also eliminated were any who had received a previous course of streptomycin, and any who required interruption of P.A.S. because of side effects. We have for clinical study 34 patients with pulmonary tuberculosis who received "combined" treatment and where the combined course of streptomycin and P.A.S. had been completed before November 10, 1949. The clinical results among those 34 patients are compared with the results among a similar number who received only sanatorium routine and streptomycin. By clinical results is meant those apparent at the termination of the course of antibiotic treatment under consideration. Comparison of the

* From the Toronto Hospital for Tuberculosis, Weston, Ontario.

clinical results at any significant period following the cessation of the course of antibiotic therapy would be unreliable because of the wide variety of other treatments applied following the completion of the course of treatment under study.

TABLE I.

Pulmonary tuberculosis	*Min.*	*Mod. adv.*	*Far adv.*	*Total*
No. of cases on streptomycin alone	8	15	11	34
No. of cases on streptomycin plus P.A.S.	5	17	12	34
Total	13	32	23	68

	Streptomycin	*Streptomycin plus P.A.S.*
Average no. of days in course of treatment	67	70
Average total dosage of streptomycin in gm.	67	70
Average total of P.A.S. in gm.	0	700

Table I shows the sampling of cases in regard to extent of disease, duration and amount of streptomycin given under the two regimens.

TABLE II.

Pulmonary tuberculosis	*Streptomycin alone*	*Streptomycin plus P.A.S.*
(*a*) Erythrocyte sedimentation rate (elevation signifies greater than 10 mm. fall in first hour—Westergren)		
elevated before treatment	25	26
significantly lowered at end of treatment (reduced by 25% or more)	19	24
(*b*) Conversion of sputum or fasting gastric contents (methods comparable before and after)		
Positive before treatment	26	23
Negative at end of treatment	18	18
(*c*) X-ray clearing—(2 physicians agreeing)		
marked	1	2
moderate	6	8
slight	19	16
none	8	8
(*d*) Cavity changes—(2 physicians agreeing)		
cavity present before treatment	16	17
cavity smaller at end of treatment	7	10
cavity closed at end of treatment	0	0
(*e*) Summary—improvement—all factors considered		
marked	1 } 6	2 } 10
moderate	5 }	8 }
slight	20	17
none	8	7

Table II shows the extent of response in regard to fall in sedimentation rate, conversion of sputum, x-ray clearing, cavity changes as well as a summary of improvement among the two groups. Only those factors which could be measured or assessed accurately have been considered. It will be noted that 10 patients receiving "combined" treatment showed marked or moderate improvement, whereas 6 patients receiving streptomycin alone showed comparable improvement. On the other hand, an almost equal number under each regimen failed to show any significant improvement.

In no patient in this study were toxic manifestations considered to be attributable to streptomycin noted of a sufficient degree to justify discontinuance of treatment. Toxic symptoms thought to be attributable to P.A.S. were encountered in a certain number of those patients receiving "combined" treatment. In order to assess these side effects, one of the authors (M.G.W.J.) studied 50 sanatorium patients not suitable for streptomycin who were given 100 c.c. of a 10% aqueous solution of the sodium salt of P.A.S. daily by mouth. This daily dosage was equivalent to 10 gm. of P.A.S. The solution was administered in 3 divided doses orally before or after meals as the patients preferred. The same author followed each patient with almost daily recording of any symptoms appearing.

Out of a total of 50 patients studied carefully for side-effects (see Table III), only 3 required

TABLE III.

SIDE-EFFECTS NOTED AMONG 50 PATIENTS RECEIVING THE EQUIVALENT OF 10 GRAMS OF P.A.S. BY MOUTH DAILY (ALL BUT 3 RECEIVED THIS TREATMENT OVER A PERIOD OF 60 DAYS)

	No. of patients	*% of total patients*
Total number of patients studied	50	100
Number of patients showing *no* side effects at any time during this treatment	26	52
Type and incidence of the symptoms noted among the 24 patients who *did* show any side-effects		
Mild nausea	14	28
Occasional diarrhœa	20	40
Mild vomiting	10	20
Marked generalized headache	5	10
Pyrexia of 102° or more by mouth	2	4
Number of patients requiring any discontinuance of the drug	3	6

any discontinuance of the treatment (sodium salt of P.A.S.) because of marked toxic manifestations appearing within the 60 day course. In these 3 cases, it was necessary to discontinue the drug permanently. One of these patients, after receiving the equivalent of 330 gm. of P.A.S. (33 days from start of treatment), developed severe nausea and vomiting with a fever of 104° by mouth. These symptoms continued for 6 days while the drug was continued. The drug was then stopped, whereupon the symptoms and fever subsided within 24 hours. Five days later the drug was recommenced and within 24 hours the same symptoms re-appeared and the temperature rose to 101° by mouth. The drug was then discontinued again (permanently) whereupon the symptoms and fever disappeared within 24 hours. The second patient, after receiving the equivalent of 160 gm. of P.A.S. (16 days from the start of treatment), developed a fever of 104° by mouth with marked nausea and vomiting. The drug was discontinued and the symptoms and fever subsided within 24 hours. The third patient, after receiving the equivalent of 60 gm. of P.A.S. (6 days from the start of treatment), began to show mild nausea and vomiting. The drug was continued but within the next 6 days the symptoms became progressively more marked in spite of the usual remedies. The drug was discontinued and the symptoms disappeared within 3 days.

Among a series of 25 patients receiving streptomycin intramuscularly and the sodium salt of P.A.S. orally also studied for side-effects by the same author, the incidence of toxic manifestations was approximately the same as among those receiving the sodium salt of P.A.S. alone.

No significant difference was observed in the incidence of side-effects among those taking their mixture with liquorice flavouring as compared with those using the oil of wintergreen flavouring.

Each patient in this study received a routine chemical and microscopic urinalysis as well as a total white blood count and a differential white blood count at some time during the course of the treatment. When examined in the above manner, no significant abnormalities were noted to appear in the urine; no significant depression of the total white blood count occurred, and no significant increase in eosinophiles was observed.

In most instances (all but 3) when mild symptoms of nausea or vomiting or diarrhœa occurred, the usual simple remedies such as bismuth and opium mixtures, aluminum hydroxide, etc., were effectual in relieving such mild side-effects without discontinuance of the sodium salt of P.A.S. Frequently, such symptoms when they appeared and were relieved, did not reappear in that patient even after the palliative remedy had been discontinued.

In this study of side-effects, 25 of the 50 patients received a 10% aqueous solution of the sodium salt of P.A.S. prepared in our pharmacy from the P.A.S. powder received from one manufacturer, and the other 25 patients received a 10% aqueous solution of the sodium salt of P.A.S. supplied by another manufacturer. Under the conditions of the study as carried out, no significant difference in the incidence of toxic manifestations was evident between the two preparations.

LABORATORY

The emergence of streptomycin-resistant strains of tubercle bacilli during and after streptomycin therapy is a phenomenon, the existence and frequency of which continues to weigh heavily in the balance of clinical judgment. The phrases "streptomycin resistance" and "incidence of streptomycin resistance" which are commonly encountered have, without further elucidation, no more than a local significance. In any communication dealing with the subject, it is, therefore, necessary to define both terms, outlining technique, concentrations of antibiotics used, and the criteria of interpretation.

At the Toronto Hospital for Tuberculosis, Weston, organisms were isolated from all patients, where possible, prior to and at monthly intervals during, and for six months following the conclusion of streptomycin therapy.[8] The tubercle bacilli were grown from material initially treated with an equal volume of a 23% solution of tri-sodium phosphate, concentrated, and planted on two diagnostic Loewenstein's slopes, thus avoiding the carrying-over of possible antibiotic in the sputum to the subsequent culture media. Streptomycin sensitivity tests were carried out on Herrold's egg-yolk medium, transferring from Loewenstein's slopes by means of a saline suspension of a cross-section of the isolated bacterial community to a series of Petri dishes in which the concentrations of streptomycin ranged from a control through 0.5, 2, 5, 10, 25 to 50 micrograms of streptomycin per c.c. Only in those instances where growth on the plate containing 50 micrograms of streptomycin per c.c. at the conclusion of a month rivalled in luxuriance the growth on the control plate, was "complete streptomycin resistance" said to have developed.

It is well appreciated that many other media are presently in use and that growth at different concentrations of antibiotic than those mentioned above is assumed to indicate the acquisition of "resistance" by the isolated bacilli. This does no more than serve as a reminder of the necessity for full definitions where the above phrases are used.

Table IV indicates the pre-therapy level of resistance in over 95% of some 225 cases investigated. The remaining 5% of cases showed pre-treatment growth of varying degrees on the 5 and on rare occasions on the 10 micrograms per c.c. plate.

TABLE IV.

PRE-STREPTOMYCIN SENSITIVITY

Micrograms streptomycin per c.c						
Control	0.5	2	5	10	25	50
Extent of growth						
++++	++++	++	0	0	0	0

Table V indicates the incidence of emergence by local definition of strains completely and less markedly resistant, in patients who received streptomycin therapy.

Having determined arbitrarily the incidence of the emergence of streptomycin-resistant strains of tubercle bacilli among patients receiving streptomycin therapy in the usual dosage (*i.e.*, 1 gram daily in two equally divided doses, over a period of 60 to 90 days), the same methods and criteria were employed to investigate 19 cases receiving concurrently one gram of streptomycin daily, plus 10 grams of para-aminosalicylic acid over an equal period of time. In these 19 cases, the para-aminosalicylic acid was administered orally as an aqueous solution of the sodium salt flavoured with liquorice or methyl salicylate. The drug was administered usually in three or five equally divided doses over a 12 hour period. Blood levels of P.A.S. determined during the course of the day showed an initial rise fifteen to thirty minutes following the first treatment of the day and rising to levels of 5 to 12 mgm. % at the conclusion of 60 to 90 minutes, falling away gently as the next dosage hour was approached. Blood specimens taken immediately before the first morning dose, failed to show the presence of the drug.

TABLE V.

INCIDENCE OF STREPTOMYCIN RESISTANCE AMONG PATIENTS RECEIVING STREPTOMYCIN ALONE FOR 60 TO 90 DAYS

	No.	%
"Completely resistant" (up to 50 micrograms per c.c.)	37	42
Less marked increase in resistance (up to 10 to 25 micrograms per c.c.)	18	20
No significant increase in resistance	33	38
Total cases	88	100

Table VI contrasts and demonstrates in percentage form the delay in emergence of "completely resistant" strains of tubercle bacilli from those patients receiving combined streptomycin and P.A.S. for 60 to 90 days when compared with patients receiving streptomycin alone for a similar period.

TABLE VI.

COMPARISON OF RESISTANCE APPEARING AFTER

(*a*) Streptomycin alone
(*b*) Streptomycin and P.A.S.

	(*a*) *streptomycin alone*		(*b*) *streptomycin and P.A.S.*	
	No.	%	*No.*	%
"Completely resistant" (up to 50 micrograms per c.c.)	37	42	0	0
Less marked increase in resistance (up to 10 to 25 micrograms per c.c.)	18	20	4	21
No significant increase in resistance	33	38	15	79
Total cases	88	100	19	100

The above effect has been obtained in patients receiving the equivalent of 10 grams of P.A.S. daily and who showed maximum P.A.S. blood levels varying between 5 and 12 mgm. % of P.A.S. Investigations suggest that much lower concentrations of P.A.S. (0.005 mgm. %) give a similar delaying action *in vitro*. This might indicate that the delay in emergence of resistant variants might be obtained in patients on combined therapy with P.A.S. dosage considerably less than that mentioned above.

No attempt was made in this study to demonstrate the acquisition of P.A.S. resistance in the tubercle bacilli isolated from any of the patients on combined therapy.

SUMMARY

1. The clinical responses of 34 patients with active pulmonary tuberculosis treated by sanatorium routine, streptomycin and P.A.S. have been compared with the clinical responses of a similar number and type of patients treated by sanatorium routine and streptomycin for similar periods.

2. When the summations of clinical responses among the two groups were compared, there appeared to be a slightly greater therapeutic response in the group receiving "combined"

treatment, but this difference was neither marked nor constant.

3. The incidence of toxic or side effects appearing among patients receiving P.A.S. or the sodium salt of P.A.S. orally in conjunction with streptomycin intramuscularly was discussed. With the dosage and method of administration used in this study and using the preparations now available, approximately 6% of patients receiving "combined" treatment by streptomycin and P.A.S. will probably require discontinuance of the P.A.S. because of side effects, within the first 60 days of this treatment.

4. In 19 cases on "combined" therapy from which tubercle bacilli could be isolated before and after treatment, the incidence of the emergence of "completely resistant" variants was seen to be markedly delayed when compared with patients receiving streptomycin alone.

5. Reference has been made to the blood levels of P.A.S. obtained with a dosage of 10 gm. of P.A.S. or its equivalent in 3 or 5 divided doses daily, and attention has been drawn to the possibility that a lower P.A.S. blood concentration might perhaps serve equally well from the aspect of delaying the onset of streptomycin resistance.

We are indebted to Merck and Company Limited of Canada for supplies of para-aminosalicylic acid and streptomycin which made this study possible. We are also indebted to the Nivea Pharmaceuticals Ltd. for a supply of the sodium salt of para-aminosalicylic acid used in the study of side effects. We also acknowledge the financial aid given in the laboratory aspects of this study by the Ontario Department of Health through the Federal Health grants.

REFERENCES

1. YOUMANS, G. P.: *Quart. Bull. Northwestern Univ. Med. School*, **20**: 420, 1946.
2. VENNESLAND, K., EBERT, R. H. AND BLOCH, R. G.: *Proc. Soc. Exper. Biol. & Med.*, **68**: 250, 1948.
3. YOUMANS, G. P., YOUMANS, A. S. AND OSBORNE, R. R.: *Journal-Lancet* (Minneapolis), **67**: 403, 1947.
4. MCCLOSKY, W. T., SMITH, M. I. AND FRIAS, J. E. G.: *J. Pharmacol. & Exper. Therap.*, **92**: 447, 1948.
5. KARLSON, A. G., PFUETZE, K. H., CARR, D. T., FELDMAN, W. H. AND HINSHAW, H. C.: *Proc. Staff Meet. Mayo Clin.*, **24**: 85, 1949.
6. GRAESSLE, O. E. AND PIETROWSKI, J. J.: *J. Bact.*, p. 57, April, 1949.
7. RIGGINS, H. M. AND GEARHART, R. P.: Combined Chemotherapy in Clinical Tuberculosis: Streptomycin and Dihydrostreptomycin in Tuberculosis, The National Tuberculosis Association, New York, 1949.
8. ANDERSON, W. AND KAAKE, M.: *Canad. M. A. J.*, **62**: 59, 1950.
9. SWEANY, H. C., TURNER, G. C., LICHENSTEIN, M. AND ENTIN, S.: *Dis. of Chest*, **16**: 633, 1949.
10. DUNNER, E., BROWN, W. B. AND WALLACE, W.: *Dis. of Chest*, **16**: 661, 1949.
11. KARLSON, A. G., DELLAUDE, A., CARR, D. T., PFEUTZE, K. H. AND FELDMAN, W. H.: *Dis. of Chest*, **16**: 667, 1949.

CERVICAL SCRAPINGS TEST

A New Method for the Early Detection of Carcinoma of the Cervix

Marion Hilliard, M.D.

Women's College Hospital, Toronto, Ont.

DURING the past five years the attention of gynæcologists has been focused on the early detection of cancer of the genital tract, particularly that of the cervix. We, of the Women's College Hospital, herewith present a simple, accurate method for the detection of carcinoma of the cervix which is new in the way the test is made, but adheres to the usual procedures of pathological diagnosis. We call it the cervical scrapings test.

We followed the work of Papanicolaou and others in this field with great interest and profit, but it was impossible for us to have a trained cytologist and the necessary laboratory. However, compelled by the desire to find some way of discovering the lesion before symptoms manifested it to the patient, we were led to investigate the possibility of early diagnosis by the pathologists using their ordinary methods.

CLINICAL PROCEDURE

To obtain the necessary material, various types of instruments were used, such as wooden spatulæ, metal, blunt and pointed curettes, and finally the use of an aspiration syringe. This material was immediately dropped into fixative and sent to the laboratory. By January, 1948, at the suggestion of Dr. W. L. Robinson, Professor of Pathology and Consulting Pathologist to the Women's College Hospital, a new technique was evolved which has now been laid down as our laboratory routine. It will be described later. Serial sections of the material are carefully screened and finally checked by Professor Robinson for diagnosis. The patient is put in the lithotomy position, examined bimanually, and the cervix well exposed by a bivalve speculum. No lubricant or antiseptic is used. The Ayre notched wooden spatula is the instrument of choice, which Dr. Ayre uses for his cervical smear method. The notch of the spatula is placed in the external os and firmly held there while the spatula is rotated three or four times in a circular motion. Then the flat end of the spatula is used to wipe the posterior surface of the cervix and posterior

fornix. The spatula is then broken in half and the two halves dropped into a screw-top test tube containing Bouin's solution and sent to the laboratory. This routine, so far, can be followed by any gynæcologist or general practitioner.

LABORATORY TECHNIQUE

A period of fixation from two to thirty-six hours is compatible with good staining. We have found that these thin scrapings may be adequately fixed in two to four hours. This fact enables us to put specimens through the same day they are obtained. Thus, we are able to render twenty-four hour service.

In the laboratory, the specimens are numbered and entered in a pathology record book. The material adherent to both ends of the spatula is carefully scraped off with a dull scalpel and placed on a piece of coral paper which is folded and put in a metal button, together with a numbered tag. The buttons are strung on a thread and are temporarily placed in a jar of 10% formalin to prevent drying, until all the buttons have been gathered together.

If a considerable amount of the non-adherent material is floating in the Bouin's solution, it is advisable to filter out this residue and add it to the rest of the material. We have found that filtration is much quicker and more satisfactory than centrifugation. The specimens are carried through the autotechnicon with the ordinary surgical material and embedded the following morning in paraffin blocks.

TABLE I.

Total number of scrapings	2,096
Gynæcology O.P.D.	714
O.P.D. symptom-free patients	105
Cancer detection clinic	754
Private doctors	491
In-patient ward	27
Not classified—all negative	5
Total	2,096

General summary of results of 2,096 scrapings.	
Positive	8
Highly suspicious	9
Suspicious	85
N.S.Q.	140
Negative	1,854
Total	2,096

8 positive scrapings from 7 patients.	
Confirmed by biopsy as carcinoma of cervix	3
Confirmed by D & C and hysterectomy	2
Confirmed by hysterectomy—negative D & C and biopsy	1
Referred to private doctor	1
Total	7

Highly suspicious of carcinoma 10 from 9 patients.	
Proved squamous cell carcinoma of cervix by D & C	1
Proved negative by D & C (1 year later Mrs. R. positive)	3
Repeated scrapings—negative	1
Repeated scraping—highly suspicious	1
Not yet repeated	3
Total	9

Serial sections are cut at a thickness of ten micra and are placed transversely to the long axis of the slide in alternate series of three consecutive sections, chosen at intervals of every ten or fifteen sections. In this manner the whole block is completely sectioned. It may require anywhere from one to six slides to accommodate these serial sections. The slides are placed in the oven in the usual manner for three-quarters to one hour at 58° C. and are then put through in the ordinary way.

Staining technique.—The staining technique used for the past year has been the routine hæmatoxylin and eosin stain. This method has proved very satisfactory in the majority of cases, but we have been endeavouring to modify our method so as to obtain a deeper and sharper nuclear stain with lighter counterstaining of the cytoplasm. Best results come with the use of fresh, well ripened Harris' hæmatoxylin; consequently, we discard the hæmatoxylin more frequently than usual. Differentiation with acid alcohol and blueing up with lithium carbonate is a very important feature in this process. As a counter stain, we have found a 2% aqueous solution of eosin for one-half to one minute quite satisfactory. At present we are experimenting with the use of a modified Mallory's phosphotungstic acid hæmatoxylin stain. So far, our experiments are not complete, but we have had some very satisfactory results by staining for shorter periods of time than recommended such as one-half to one hour.

From January 8, 1948 to April 15, 1949, we examined 2,096 scrapings. The first 669 were reported upon at the Canadian Medical Association in June, 1948. We had three sources of material: (1) out-patients — gynæcological clinic; (2) Cancer Detection Clinic of symptom-free women; (3) private doctors.

In order to make sure there had been no false negatives, letters were sent out to those patients who had been examined last year in the order in which they had their scrapings test done. These women had no symptoms and returned because of our interest in them. We were surprised at the interested response of these clinic patients: 75% either came, telephoned or their letters were returned. In examining these 105 patients, we were able to make a diagnosis on every patient—there was no "insufficient material".

Two scrapings came back "positive" and startled us greatly, as we were unprepared for this result. Mrs. F. who had had a suspicious scraping in November, 1947, confirmed by biopsy as squamous cell carcinoma of cervix (see Fig. 1) was treated at the Institute for Radiotherapy at the Toronto General Hospital in November, 1947. Patient was apparently cured, reporting at regular intervals for observation only. Her scrapings in March, 1949, showed "residual carcinoma cells" (see Fig. 2). It is interesting to compare this scraping with one on Mrs. M. who had a suspicious scraping April 27, 1948, confirmed by biopsy (Fig. 3) "squamous cell carcinoma of cervix" treated

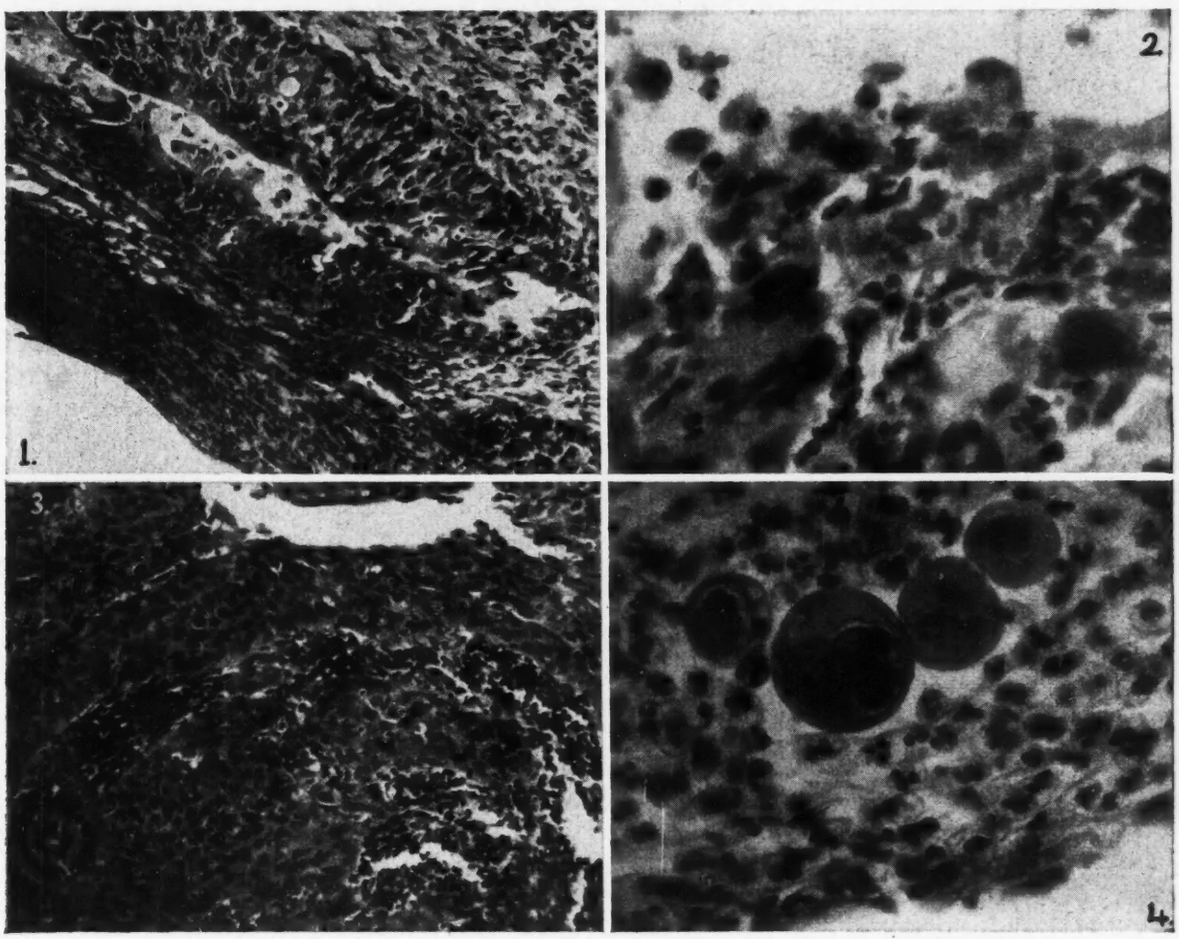


Fig. 1.—Biopsy — squamous cell carcinoma of cervix. **Fig. 2.**—Cervical scraping after treatment showing residual carcinoma cells. **Fig. 3.**—Biopsy — squamous cell carcinoma of cervix. **Fig. 4.**—Cervical scraping one year after a highly suspicious scraping. Positive for carcinoma.

in the same manner at the Institute of Radiotherapy. Mrs. M. now has a negative scraping. These two women have had the same condition —Grade 2 carcinoma of cervix treated in the same way; neither has any gross sign of a lesion or any symptom of discharge, one has residual cancer cells and one has not.

The other startling positive finding was on Mrs. R., aged 51, who came to clinic March 1, 1948, complaining of hot flushes, last menstrual period in October, 1947. Routine cervical scraping was "highly suspicious". March 16, scraping was repeated—report "highly suspicious". April 6, dilatation and curettage done, and biopsies were taken from the anterior and posterior lips of cervix and cervical canal. Pathological report "chronic cervicitis". March 1, 1949, routine one-year examination, cervical scrapings "positive for carcinoma" (Fig. 4). Panhysterectomy done — report "squamous cell carcinoma *in situ*. No evidence of spread." This case proves that the cervical scrapings method can be even more reliable than several well considered biopsies and a curettage done by a gynæcologist. "The lesion was found as a small, roughened area about 0.5 cm. beyond the external os—out of reach of any biopsy. It was in a furrow along the right side of the canal, where it would not probably be disturbed by dilatation and curettage."

CONCLUSIONS

1. We present a simple accurate method for the detection of carcinoma of the cervix. It can be done by the gynæcologist or the general practitioner. The diagnosis can be made by a well-trained pathologist.

2. The cervical scraping method will pick up cells which the best placed biopsies may miss.

3. The cervical scrapings section may be more conclusive and give a better picture of malignancy than the biopsy.

4. The cervical scrapings method is of great value in the early diagnosis of cervical cancer. It is painless, harmless, and the procedure may be carried out with impunity. It is a simple method for following up the results of treatment.

We would like to thank the laboratory of the hospital for its co-operation and the extra work which was involved, and Beryl Burgess for her technical skill and interest.

ATELECTASIS*

W. Ross Wright, M.D.

Fredericton, N.B.

ATELECTASIS is a condition whose presence is often overlooked, and often diagnosed as pneumonia, or some other condition. More frequent x-ray examinations, together with an increased consciousness on the part of the clinician of the frequency of this condition are responsible for the proper diagnosis of more and more cases. It is found most frequently following operations on the chest and upper abdomen.

Dripps and Deming[1] in a review of 1,240 cases of upper abdominal operations, divide them into two series: the first from July, 1941 to December, 1942, in which atelectasis occurred following inhalation anæsthesia in 11%, and following spinal anæsthesia, in 4.2%. They then adopted a prophylactic regimen, and in the second series, from December, 1942 to October, 1945, the occurrence of atelectasis following inhalation anæsthesia dropped to 4.1%, and following spinal anæsthesia was 5%.

Kruger, Marcus and Hoerner[2] in a review of 6,553 cases of major surgery, found atelectasis in only 30 postoperative cases, and all of these except four recovered without bronchoscopy.

There are many factors responsible for the development of atelectasis. Its prevention will be greatly aided by careful attention to the patient preoperatively, in postponing all surgery in the presence of acute upper respiratory infections wherever possible, and in chronic cases, using all available means, such as posture, coughing, and even bronchoscopy, to rid the respiratory tract of secretion. The anæsthetist plays an important rôle in aspirating secretions from the endo-tracheal tube and the oropharynx, and in keeping the patient as lightly under as possible, and in ensuring at the end of the anæsthetic, that the absorbable gases in the alveoli are replaced with air whose high nitrogen content aids in preventing atelectasis from rapid absorption of gases.

The postoperative nursing care requires careful supervision by the surgeon. Frequent turning of the patient, careful aspiration of all secretions from the mouth, the administration of carbon dioxide, and the judicious use of sedatives are all important factors in keeping atelectasis at a minimum. Morphine tends to inhibit ciliary action and to depress the cough reflex, but it serves a useful purpose in preventing the pain from coughing.

Drugs,[3] such as ammonium chloride, which tend to liquefy the bronchial secretions, and ephedrin, which relieves bronchial spasm, are very useful postoperatively. If atelectasis does occur, then treatment should be begun at once. Posturing of the patient, thumping the chest, administration of carbon dioxide, and encouragement to cough, bring about relief in a great many cases, but if after three or four hours, there is no improvement, then bronchoscopy should be performed. It is a grave mistake to wait until the mucous plug becomes drawn down into the smaller bronchi beyond the reach of the aspirator. Changes in the bronchi, which lead to bronchiectasis, and in the lung parenchyma, with stasis of the circulation of the lung and exudate into the alveoli and the pleural cavity, make resolution impossible.

The following case report demonstrates what happens postoperatively when blood is aspirated into the bronchial tree, and the results when bronchoscopic drainage is instituted in time.

CASE 1

A boy, L.H., aged 16, was admitted to Victoria Public Hospital, December 28, 1945, for tonsillectomy. Operation was performed under general anæsthesia, with preliminary medication of nembutal gr. iss, morphine gr. 1/6 and scopolamine gr. 1/150. Fifteen minutes after returning to the ward, it was noted by the nurses that the patient was pale and bleeding slightly from the mouth. Twenty minutes later, he became cyanosed; his pulse increased from 100 to 120. The foot of the bed was elevated, and suction was used. The patient went into a state of shock; pulse dropped to 72, and became irregular. He was given 1 c.c. each of synkamine, neo-

* Read at the Eightieth Annual Meeting of the Canadian Medical Association, Section on Otolaryngology, Saskatoon, June 16, 1949.

hæmoplastin and coramine, and 500 c.c. of whole blood intravenously. X-ray of the chest was done, and showed the mediastinal contents to be shifted to the right, the ribs retracted, and a great deal of patchy opacity throughout both the right and left lungs. The appearance suggested a partial atelectasis on the right side with the usual reaction in the lung tissues, with possibly a similar, though less severe process on the left side. Six hours after the onset of bleeding, the bronchoscopist was consulted, and with no anæsthesia and the patient still in a state of shock, large amounts of blood-stained mucus and blood clots were aspirated from both the right and left bronchi. During this procedure, the mediastinal contents appeared to shift to the left. The patient's colour improved, and on return to the ward, the nurses were instructed to give no sedatives and to encourage deep breathing and coughing. Penicillin intramuscularly 25,000 units q.4 h. was given. The condition of the patient continually improved, and for the next few days there was considerable expectoration of dark blood-stained mucus. X-ray of the chest was repeated 48 hours after bronchoscopy, and the report was as follows: "A re-examination of the chest still shows considerable mediastinal shift to the right. There is a slight relative opacity throughout the right lung which is more marked in the upper portion of the lung, but the general widespread infiltration which was seen at the last examination has all disappeared. The left lung is now entirely clear." This patient was discharged from hospital January 3, 1946, completely recovered.

Another type, atelectasis of the newborn, has given us much concern, and in the past few months has come increasingly to the attention of the bronchoscopist. It has been found that the majority of these cases require more than average resuscitation immediately after being delivered, but on being admitted to the nursery appear normal and breathe well for an hour or two, and some time later, within the first twelve hours, they are noticed to be grey and cyanosed, and to exhibit jerky respirations. The chest wall appears to be inactive and an irregular spasm of the diaphragm occurs with marked indrawing of the upper abdomen and the lower intercostal spaces.

One of these cases, delivered by low Cæsarean section on March 21, 1949, was noticed on being admitted to the nursery to have abnormal breathing. The colour was fairly good, and the cry was strong. Aspiration with a catheter between the cords with the aid of the laryngoscope was done immediately, and a thick plug of mucus was removed. The breathing became normal, and the baby did well after. In this case, we are of the opinion that the baby aspirated fluid and mucus which was regurgitated from the stomach.

However, only a small percentage of these cases which show cyanosis and abnormal breathing can be cured by aspiration. In a series of 23 cases reviewed by House and Owen,[4] two cases or 11.7% were demonstrated to be due to true atelectasis. Beck,[5] in a review of 100 cases of neonatal death, classifies them as follows: congenital anomalies, 32.6%; infection, 9.9%; brain hæmorrhage, 14.8%; congenital atelectasis, 41.5%. Clement A. Smith[6] states that in apparently normal infants x-rayed ten days after birth, 20% were shown to have some atelectasis present.

The jerky inspiratory phase with no expiratory component is due to poisoning of the respiratory centre which can be attributed to various causes, such as: too much pre-anæsthetic medication, too much anæsthesia, too little oxygen with the anæsthetic, premature separation of the placenta, compression of the cord, trauma to the brain, enfeebled control of respiration, as in prematures. Oxygen is the most important part of the treatment of these cases, and Smith[6] advocates using pressure of 35 to 40 cm. of water or 26 to 30 mm. of mercury for the first expansion. He believes that drugs are of no value whatever.

Another case will serve to demonstrate atelectasis, due not to bronchial obstruction, but to hæmorrhage of the brain.

CASE 2

Baby P.T., delivered April 11, 1948 at 11:41 a.m. Mucus was suctioned from throat. Child cried well. At 6:00 p.m. hands and feet were cold and cyanosed. April 12, 5:25 a.m., aspiration with catheter through cords using direct laryngoscope.; 6:20 a.m., baby expired. Autopsy was performed. The lungs were removed and placed in a pan of water and sank to the bottom. There was no evidence of aeration of any portion of the lungs. Examination of the cranium revealed a tentorial tear with blood clot lying on the brain, and extravasation of blood in the subarachnoid space.

Anything which causes obstruction to the free passage of air through the bronchi may lead to atelectasis. The obstruction may be a foreign body in the bronchial tree or pressure from within by enlarged glands, which may be tuberculous, or involved in a lymphatic spread of carcinoma. One type of primary bronchiogenic carcinoma which causes stenosis may relatively early obstruct a bronchus. Whatever the cause of obstruction, the sequence of events is much the same. When the obstruction is almost complete, the expansion of the chest wall with resulting widening of the lumen of the bronchi during inspiration allows air to be drawn in, but the narrowing of the lumen during expiration prevents escape of air. The result is emphysema. When œdema of the mucous membrane, increased exudate in the case of an aspirated foreign body, or further enlargement of the gland or neoplasm without

the bronchial wall make the obstruction complete, the emphysema is converted to an atelectasis in the space of about six hours.

Atelectasis in a patient of cancer age without other obvious cause, should call for establishment of a diagnosis as soon as possible. A careful history and physical examination, bronchoscopy, bronchography, biopsy and cytologic studies of bronchial secretions are essential procedures.

Jackson and Konzelmann[7] in a review of 32 cases of bronchial carcinoma found atelectasis in 17 cases. Costello and O'Brien[8] in 47 cases found atelectasis in two. In 336 cases from 1930 to 1945, Clerf and Herbut[9] found 30 in females, or 10%.

CASE 3

C.H., male, aged 68, was admitted to Victoria Public Hospital, October 7, 1948, complaining of pain in the chest for three weeks with extreme dyspnœa and some mucoid sputum; loss of appetite for past six weeks and tiredness; loss of 17 pounds weight in one week.

The chest pain usually came on after going to bed, and was aggravated by taking a deep breath which seemed impossible because of a full feeling in his chest. There was no hæmoptysis. Chest movements were fairly equal. Breath sounds at the left base were absent. Rhonchi and medium coarse râles were heard on the left. The heart was not enlarged. Sounds were distant and regular. There were no murmurs. P2 was louder than A2. Blood pressure 110/70. There were no enlarged lymph nodes. The liver and spleen were not palpable. There was no dependent œdema. Neurological examination revealed a bilateral Babinski, but no other abnormality. Hgb. 66%; red blood cells 3,110,000; white blood cells 13,700 (normal differential); non-protein nitrogen 37; blood sugar 141; sedimentation rate 34 mm. in one hour (Cutler); urine contained a few red blood cells. An electrocardiogram was definitely abnormal, compatible with coronary insufficiency, but no evidence of a recent infarct. He was treated as a case of coronary heart disease with early congestive failure. Repeated sputum examinations for mycobacterium tuberculosis, and for neoplastic cells (Papanicolaou technique) were negative. X-ray of the chest showed an atelectasis in the lower half of the left lung. Examination of the gastro-intestinal tract showed no abnormality; a few gall stones were seen.

Bronchoscopy revealed some widening of the carina and narrowing of the lumen of the bronchi in the left lower lobe, but no tissue in the bronchi from which a biopsy could be taken. Patient died 41 days after being admitted to hospital, and autopsy revealed the right lung and the left upper lobe to be relatively normal. The left lower lobe was deep purple in colour, heavy and consolidated. At the junction of the left postero-basic and middle-basic bronchi, the mucosa of the bronchi had a cobblestoned appearance, and outside the lumen was a mass the size of a lemon, which enveloped the smaller bronchial divisions. There were no intrinsic obstructing lesions in the bronchi. Distal to the tumour mass, the lung was solid and contained no air. Histologically, the lung showed a primary carcinoma, bronchiogenic type, with metastatic spread throughout. The heart showed cloudy swelling. There was metastatic carcinoma in the kidneys, liver, adrenals, and mediastinal lymph nodes.

In conclusion, I wish to emphasize that atelectasis is a fairly common condition which should be borne in mind in all cases post-operatively regardless of the type of anæsthetic used. Where any morbidity exists, an x-ray of the chest should be done. A prophylactic regimen should be carried out in all cases and this means paying strict attention to details in the preoperative, operative and postoperative care of the respiratory tract.

The discovery of atelectasis calls for an immediate attempt to establish a true diagnosis and for immediate remedial measures. The bronchoscopist should be consulted early, and after simpler measures have failed to expand the lung, bronchoscopy should be performed.

In the case of atelectasis of the newborn, we must bear in mind that this condition often persists for several days, and is symptomless. However, when abnormal breathing and cyanosis occur, I believe that until we are able to differentiate clinically between those cases which are due to simple obstruction of the bronchial tree and those which are due to other causes, such as brain hæmorrhage, all these cases should be bronchoscoped, bearing in mind the great importance of maintaining at all times a high concentration of oxygen in the blood.

There is no doubt that early diagnosis and adequate treatment of atelectasis will prevent many cases of bronchiectasis and lung abscess, and may help in the future to bring many cases of bronchiogenic carcinoma to surgery while they are still operable.

REFERENCES

1. DRIPPS, R. D. AND DEMING, M. V.: *Ann. Surg.*, **124**: 94, 1946.
2. KRUGER, A. L., MARCUS, P. S. AND HOERNER, M. T.: *Am. J. Surg.*, **73**: 531, 1947.
3. ARONOVITCH, M.: *Canad. M. A. J.*, **53**: 222, 1945.
4. HOUSE, H. P. AND OWEN, H.: *J. Pediat.*, **28**: 207, 1946.
5. BECK, A. C.: *Am. J. Obst. & Gynec.*, **51**: 173, 1946.
6. SMITH, C. A.: *Bull. Vancouver M. A.*, **23**: 311, 1947.
7. JACKSON, C. L. AND KONZELMANN, F. W.: *J. Thoracic Surg.*, **4**: 165, 1934.
8. CORSELLO, J. N. AND O'BRIEN, W. B.: *Rhode Island M. J.*, **30**: 15, 1947.
9. CLERF, L. H. AND HERBUT, P.: *Am. J. Med.*, **1**: 168, 1946.
10. HOLLINGSWORTH, R. K.: *Ann. Int. Med.*, **26**: 377, 1947.
11. BAUM, O. S., RICHARDS, J. H. AND RYAN, M. D.: *Ann. Int. Med.*, **12**: 699, 1938.
12. VISWANATHAN, R.: *Dis. of Chest*, **15**: 460, 1949.
13. WYLIE, W. D.: *St. Thomas's Hosp. Gaz.*, **44**: 192, 1946.
14. SAWYER, L. L.: *Arch. Otolaryng.*, **46**: 45, 1947.
15. GRUENWALD, P.: *Am. J. Obst. & Gynec.*, **53**: 996, 1947.
16. PENTA, A. Q.: *Arch. Otolaryng.*, **48**: 233, 1948.
17. WOODWARD, F. AND WADDELL, W. W. JR.: *J. Pediat.*, **23**: 79, 1943.
18. GORDON, R. A.: *Canad. M. A. J.*, **54**: 6, 1946.
19. RABIN, C. B.: *Laryngoscope*, **42**: 923, 1932.
20. COOPE, R.: Diseases of Chest, 2nd ed., February, 1948.
21. RUBIN, E. H.: *Dis. of Chest*, May, 1948.

361 Regent St.
Fredericton Medical Clinic.

SURGICAL TREATMENT OF COARCTATION OF THE AORTA

Gordon Murray, M.D., F.R.C.S.[C.& Eng.]

Toronto, Ont.

COARCTATION or stenosis of the aorta may occur at any level, but occurs most commonly at a site just distal to the origin of the left subclavian artery. This is the site from which the embryonic right arch is detached during the development of the main left mammalian aorta and this obliterative process may have something to do with the stenosis occurring at this level (Fig. 1).

Many degrees of stenosis occur and in minor cases there may be no signs or symptoms and even in the more severe forms, if the collateral circulation is adequately developed, there may

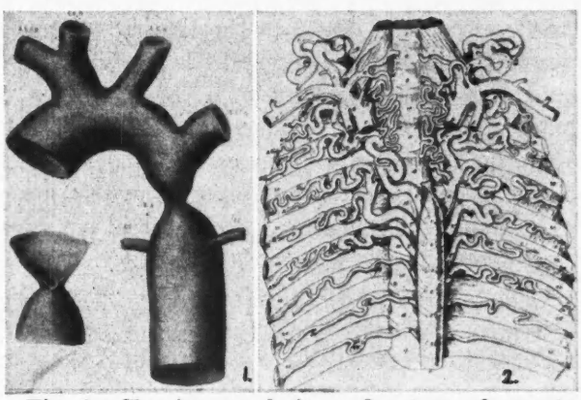


Fig. 1.—Showing usual site and a type of coarctation of aorta (from J. Cruveilhier). **Fig. 2.**—Showing enlarged intercostal and other collateral vessels and stenosis after removal of heart and arch of aorta (from A. Meckel).

be few ill effects.[4] On the other hand, if the stenosis is severe and the collateral circulation is inadequate, then the patient may have serious and disastrous symptoms. The effects in general are those of greatly increased blood pressure in the head, neck and upper extremities with diminished pressure in the lower thorax, abdomen and lower extremity. As a result of these effects, the patient suffers from evidence of hypertension, perhaps with headache, which may be disabling, a sense of weakness, and fatigue. In the later stages, retinal hæmorrhages, vascular disease of the cerebral and coronary vessels occur causing cardiac and cerebral symptoms and these may go on to cerebral hæmorrhage, coronary artery occlusion with infarction, or rupture, or dissecting aneurysm of the arch of the aorta or other main vessels in this region. The symptoms may begin in late childhood or during the 'teen age, and may be disabling. In a young person with such symptoms, careful search must be made to rule out the possibility of coarctation of the aorta.

In the lower extremities and abdomen, the effects are the reverse. The individual may or may not have normal development of the lower half of the trunk and extremities, but on exertion there may be weakness and early fatigue, probably as a result of too little circulation and the inability to provide an adequate increase of circulation during exercise.

It is obvious, therefore, that if in a young person there is a high blood pressure in the upper extremity, the blood pressure should immediately be taken in the lower extremity. If

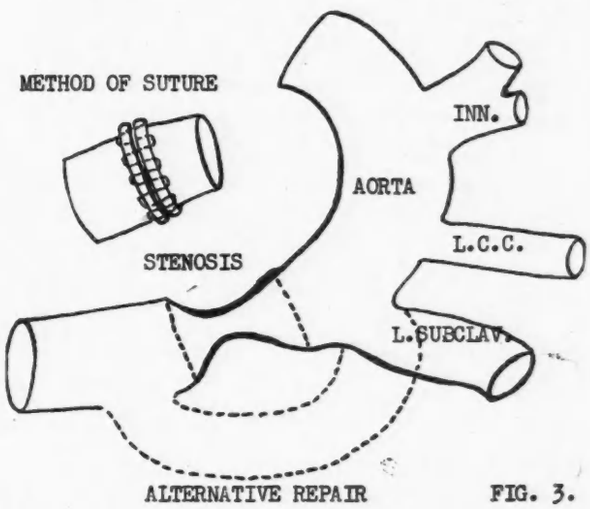


Fig. 3.—Showing methods of repair and of suturing.

there is a great disproportion between these two, registering a high level in the upper extremity and zero, or a lower pressure in the lower extremity, a thorough investigation must be undertaken immediately.

As a result of the stenosis, the enlarged intercostal, internal mammary and scapular vessels which bridge the stenosis, provide clinical evidence in the form of pulsating vessels over the thoracic, dorsal and scapular regions. The subclavians may be enlarged and bounding above the clavicles. The radial pulses are very strong and the vessels large, whereas in the lower extremities the reverse is the case. There may be a systolic bruit heard best over the great vessel region in front and perhaps in the interscapular region also. Rarely is there a thrill palpable.

X-rays of the chest show notching of the lower borders of the ribs from three to seven,

resulting from the excavation from the greatly dilated intercostal vessels at this level. In the extreme cases the heart is enlarged. Sometimes diminution of the size of the aorta below the level of the descending aorta may be seen. There is no polycythæmia and no increase of hæmoglobin or hæmatocrit readings.

The investigation carried out by Crafoord[1] and others is useful on occasions. This involves catheterization of the aorta by passing the instrument through the brachial and subclavian arteries on the left side and into the arch of the aorta. The tip of the catheter must be directed so that it goes down the arch to the site of the obstruction and not toward the aortic valves. When it has reached the site of the obstruction, 30, to 40 c.c. of 70% diodrast are quickly injected and x-rays made instantaneously. This may show the site and the degree of the obstruction, giving nice evidence confirming the diagnosis and some evidence regarding the indications for or against operation, depending on the degree of obstruction.

The symptoms may appear in early childhood. If it is a severe condition they increase in intensity during youth and in early adult life, and may become very disabling. If the condition is a minor one, there may be no interference with function or the life span.

Indications for and against operation.—If, in a young person, a severe degree of stenosis is detected, if there are striking symptoms and signs, as indicated, then operation should be undertaken in late childhood or during the early teen age. If the patient reaches the age of twenty or thereabouts, the clinical effects may be so marked and the vascular changes may have reached a stage where even though the obstruction is corrected, they may be irreversible and the operation is not worth while. In the opinion of Gross,[2] and Crafoord,[1] beyond twenty or twenty-one years of age, the prospects in severe cases are not good and it is doubtful if the operation is worth while. I have found that up to twenty or twenty-one years of age, a good result may be expected in some, but beyond this age, the prospects are not good, and if there are evidences of severe vascular changes, as demonstrated on retinal examination, or with the patient already having had coronary infarction or cerebral accident, then the operation should not be performed.

Operation.—The operation may be undertaken through one of two approaches; first anterolaterally through the third or fourth intercostal space, where a fair exposure is obtained. However, my preference is for a posterior approach dividing the third, fourth, fifth and sixth ribs, taking out the sixth and going through the periosteal bed of this rib, the chest is opened. In this approach one encounters enormous numbers of greatly dilated, thin-walled arteries which are part of the collateral circulation bridging the site of the anastomosis (Fig. 2). These are difficult to manage and should be controlled to prevent extreme loss of blood. The intercostal bundles are divided. Immediately the site of coarctation can be demonstrated. The enlarged arch of the aorta, which shows violent pulsation, together with the carotid and subclavian vessels stand out, while the aorta, distal to the site is smaller, is under much lower pressure, is softer to feel and has quieter pulsation. On opening the pleura over the aorta, the stenosed area can be examined, and by compression one can get some indication of the change in pressure and the change in pulsation of the distal segment, and can estimate whether there is much blood passing through the stenosis. As dissection proceeds, to isolate this area, the enlarged intercostal vessels entering the distal segment of the aorta are encountered and must be handled with great care to avoid disaster. At least two, and sometimes three pairs, of these must be divided to mobilize sufficient aorta, with which to work. As the upper end is cleared, the œsophagus and thoracic duct lying deep to the aorta must be protected, as must the vagus and recurrent laryngeal nerves which come directly in the field. In all my operations there has been a very thick, strong ligamentum arteriosum or a patent ductus arteriosus, which must be divided to allow mobility for repair of the aorta.

It can be seen at this stage whether the defect is a diaphragm shutting off the lumen in a fairly normally developed aorta or whether it is a long spindle-shaped stenosis (Fig. 1). Under the latter conditions, a fair length of the vessel must be excised to reach an adequate lumen and once this is done, it may be impossible to bring the ends together for suturing. If this can be done, it is the ideal procedure but if it cannot, the arch above the stenosis should be closed and the

left subclavian which is enormously dilated should be divided at the apex of the pleura and brought down for end-to-side or end-to-end anastomosis with the distal segment of the aorta. This has been done in two of my cases with satisfactory results in all respects. There have been no ill effects on the arm as a result of this, probably because of the enormously dilated collateral circulation in which the arm vessels have taken part and which now are in a position to provide a reverse flow to keep the arm satisfactorily nourished. Within a short time, between three and six weeks, the pulsation has returned in the radial vessel in all cases.

Another method suggested by Gross is the application of a venous graft to bridge the gap according to principles worked out earlier by the author,[3] or of a preserved aortic graft. The results of these methods, however, will have to be observed as time goes on.

The suturing of the aorta is accomplished by applying a continuous everting mattress suture of silk. When the suture is completed, the clamp is removed from the distal end and if the anastomosis holds satisfactorily, the clamp on the proximal end is gradually released. This must be taken off slowly and with great care to prevent a sudden emptying of the heart as a result of the sudden removal of the strong peripheral resistance to which the heart has been accustomed since birth. If, however, it is gradually released, eventually the return to the heart is adequate, after such time as the vasomotor system has been able to adjust to the new conditions of circulation in the lower extremities and the abdomen. When this adjustment has been accomplished as indicated by a stable blood pressure and a steady pulse, the clamp can be removed completely and the pleura repaired. The chest is closed after aspirating the pleural cavity. The patient requires nursing with the foot of the bed elevated and in an oxygen tent.

It is very satisfactory, immediately after operation, to feel the first pulsation in the lower extremities and to find a blood pressure in the legs equal to that in the arm; which is the test of a satisfactory procedure having been accomplished.

I have operated upon six patients, five of whom survived. Two of these were each twenty-one years of age, and, in spite of some doubts regarding the value of operation at this time, they both have an excellent end result and have had a return of blood pressure to almost normal levels, that in the leg being equal to that in the arm. They have both returned to regular work and feel much improved and are well satisfied with the result. In three younger people the results have been good with practically normal return of function in one, but in the other aged 16, the blood pressure remains at 160 systolic in both the arm and leg.

The patient who did not survive was 16 years of age. He did not seem to be a very severe case and during operation things were progressing satisfactorily and there seemed to be no untoward effects. The site of the coarctation had been exposed and cleared. The dissection was being carried around the segment of the aorta distal to the stenosis and the enlarged intercostal vessels had been divided and everything was progressing satisfactorily, when, without warning, there was a sudden cardiac arrest. We were not handling the vagus or the heart at this stage, and we were nonplussed to know why this should have happened. Immediately a transfusion was given into the arch of the aorta to raise the pressure above the site of the stenosis. With massage of the heart, the circulation was reestablished and there was fairly good heart beat. It continued its action fairly well for a few minutes and then subsided again, when with massage its action again returned. As we had not divided the aorta, we thought it inadvisable to continue and the chest was rapidly closed after aspirating the pleura. It was hoped with transfusions, he might survive, but within a few hours he succumbed and we were uncertain why this should have happened. There had been very little loss of blood, and up to this moment the anæsthetist reported no ill effects in pressure, pulse rate or otherwise. In none of the other patients operated upon, was there any indication of such an incident.

SUMMARY

In severe coarctation giving symptoms of hypertension, with enlargement of the heart, if the patient is under 20 years of age, surgical repair offers good prospects of improvement.

REFERENCES

1. CRAFOORD, C. AND MYLIN, G.: *J. Thoracic Surg.*, 14: 347, 1945.
2. GROSS, R. E. AND HUFNAGEL, C. A.: *New England J. Med.*, 232: 288, 1945.
3. MURRAY, G.: *Brit. J. Surg.*, 27: 107, 1940.
4. ABBOTT, M. E.: Atlas of Congenital Cardiac Disease; American Heart Association, 1936.

502 Medical Arts Bldg.

NON-SPECIFIC MESENTERIC LYMPHADENITIS

W. E. Austin, M.D., F.R.C.S.(Edin.), F.A.C.S.

Vancouver, B.C.

DESCRIPTIONS of enlarged mesenteric glands as a cause of abdominal pain have appeared in the literature since the British authors Carson[1] in 1918 and Struthers[2] in 1921 gave accounts of it. They, however, did not distinguish between tuberculous and non-tuberculous adenitis and, indeed, thought that all were due to tuberculosis. In 1920 Wilensky,[3] on this continent, reported three cases of mesenteric adenitis of non-tuberculous origin and shortly after stated that "Mesenteric lymphadenitis is a syndrome which has in recent years established itself as a definite clinical entity." In the next year, Brenneman[4] pointed out the association of abdominal pain with upper respiratory tract infections in children. Since then scores of writers have analyzed hundreds of cases of non-specific mesenteric lymphadenitis but a perusal of the literature reveals that its etiology is still obscure and its diagnosis beset with pitfalls, and indeed not commonly made apart from laparotomy.

My interest in this condition was stimulated by the case of a girl, aged 9 years, who was seen in September, 1948, with complaints of colicky abdominal pain and nausea, but no vomiting. The pain had been peri-umbilical but became right-sided. It had begun mildly the day previously, when she had been at school, and had gradually increased in severity during the day of admission. There was a history of a previous attack a year before, which had subsided. On examination, her temperature was 102.8° and pulse 96 per minute. There was no evidence of upper respiratory tract infection and no history of a recent cold. There was very definite tenderness with muscle guarding in the lower right quadrant and tenderness on the right per rectum. There was a suggestion of fullness in this quadrant also. Urinalysis was negative except for a trace of acetone. The white blood count was 14,550, with 45% polymorphonuclears, 24% "staphs", 24% lymphocytes and 7 monocytes. Operation was performed with a diagnosis of acute appendicitis. On opening the peritoneal cavity, a considerable mass was found in the right lower quadrant, which involved the lower end of the ileum, the mesentery and the cæcum. There were numerous firm, discreet reddish glands in the mesentery. There was a cuff of œdema at the lower end of the ileum for about three inches, with some œdema of the adjacent cæcum. This area of œdema was not reddened but rather paler in colour than the normal bowel. The appendix was somewhat congested on the surface but showed no evidence of acute inflammation. The pathological report on the removed appendix was generous enough to call it a chronic recurrent appendicitis.

Subsequent thoughts on the subject revolved about the following questions: (1) What is non-specific mesenteric lymphadenitis? (2) Could it be differentiated from acute appendicitis pre-operatively? (3) Has it any relation to appendicitis? (4) What caused the œdema of the ileum, cæcum and mesentery? Was it really a case of mesenteric adenitis or could it be an early stage of regional ileitis? Are the two conditions related? (5) Does mesenteric adenitis ever go on to regional ileitis?

The etiology of non-specific mesenteric lymphadenitis is, as I have said, entirely unproved, though it seems safe to say that there may be more than one cause. Many gland cultures have been done, with a few varied positive results and many negative cultures. The following is a list of suggested causes: upper respiratory infections with secondarily infected mesenteric glands; appendicitis; tuberculosis; all granulomata; typhoid and undulant fever; intestinal influenza; intestinal stasis with absorption of histamine, etc.; infectious mononucleosis; intestinal parasites; malignancies; Hodgkin's; leukæmias; allergies; vitamin deficiencies; food poisoning; metallic or other poisoning; dysentery; poliomyelitis.

With a view to obtaining first hand information, a survey was made of 20 operative cases from the Vancouver General Hospital records 1946-48, in all of which appendicitis was suspected and in which enlarged mesenteric glands were found as the main condition. The findings in this group, with few exceptions, are not different from those of many other and larger series. All were in the age group 4 to 20 years. Fifteen of them came to operation in the months August to December inclusive. None had recorded upper respiratory tract infection, though several authors suggest this as a very common accompaniment. Five cases had had one or more previous attacks of pain. In one case a few neck glands were palpable. In five cases the pain was in the lower right quadrant only and in one, across the lower abdomen. In all the others it was epigastric, peri-umbilical or generalized to begin with, settling in the R.L.Q. later. It was crampy or colicky in three cases, being so severe in one that the child screamed with each attack. Nausea or vomiting, or both, were mentioned only nine times. Diarrhœa was noted three times. The temperature ranged from 99.2 to 102.8°. Tenderness in the R.L.Q. or occasionally more generalized was present in all cases and rebound tenderness in four. Rigidity was evident in seven cases, mainly on the right. The white blood count in nine recorded cases ranged from 11,900 to 18,300 and

	Season	Age	Previous attacks	Upper resp. infect.	Other glands	Operation findings	Symptoms	Signs
1.	Sept.	17	?	No	Neck—few	Appendix normal. Extensive ileocæcal adenitis.	Nausea. No vomiting. Diarrhœa. Pain umbil. shifting to R.L.Q.	No rigidity. Rebound T. Hyperæsthesia. Tender in R.L.Q. Temp. 99 to 100° 2 days.
2.	Nov.	20	1944	No	No	Appendectomy. Acute ileo-cæcal adenitis.	Nausea. Epigast. pain shifting to R.L.Q.	Rebound tenderness in R.L.Q. Muscle splinting Temp. 98°.
3.	Aug.	8	?	?	?	Appendectomy and chronic productive mesenteric adenitis.	Pain R.I.F. Tenderness 5 to 10 days. Nausea. Diarrhœa.	Rebound tenderness. Temp. 100°—up to 99° for 2 weeks.
4.	Feb.	8	?	?	?	Retro-cæcal appendix. Acute, enlarged mesenteric glands. Section of node very cellular appearance. Germinal follicles scanty and sinusoids not well demonstrated.	Pain in R.L.Q. 36 hours. No vomiting. Tender in R.L.Q.	Temp. 99.2° on admission.
5.	Dec.	5½	No	No	No	Normal appendix. Mesenteric adenitis. Cut sections of worms.	Abd. colic 4 days. Screamed with pain at times. No vomiting. Diarrhœa 1 day (thought ruptured appendix) temp. 102°. Normal on 6th day.	Had worms. Muscle guarding espec. in R.L.Q. Tender all over. Rectal tenderness right.
6.	Nov.	10	No		No	Chronic productive appendicitis. Peyer's patches in ileum distinctly palpable. Enormously enlarged ileocæcal lymph nodes.	Cramp pain in R.L.Q. vomiting. Tonsils out. Temp. 99 to 100.6°. Normal on 5th day.	Pain and rigidity R.L.Q. W.B.C. 13,500. Acetone +4 in urine.
7.	Oct.	20	?	?	?	Appendectomy. Chronic productive mesenteric adenitis.	Abdominal discomfort. No history	Temp. 99.4°. Normal on 4th day.
8.	Oct.	15	?	?	?	Appendectomy. Chronic productive mesenteric adenitis. Some free sero-sanguineous fluid.	Temp. 94.4 to 101.2° slight rise for 2 weeks. W.B.C. 18,000; on 5th day 7,400. Sed. rate next day 8/44.	
9.	Nov.	19	Past 2 months	No	No	Chronic productive appendicitis. Gland biopsy showed œdema and inflammation hyperplasia.	Temp. 99.6° normal on 6th day. Pain in R.L.Q. More frequent past 24 hrs. No vomiting or diarrhœa.	Slight tenderness in R.L.Q. No nausea.
10.	July	11	No	No	No	Appendicitis. Chronic productive. Lymph glands in terminal ileum greatly enlarged and mesentery slightly œdematous. No evidence of T.B. or regional ileitis. W.B.C. 8,500, 6,300 postoperative with sulfa.	Pain about umbilicus then to R.L.Q. No vomiting or diarrhœa. Previous tonsillitis. Temp. 99.8 to 101.4°. Normal on 10th day.	Tender in R.L.Q. Negative for typhoid W.B.C. 15,550.
11.	May	14	?	?	?	Append. Chronic productive. Free fluid in peritoneal cavity. Terminal ileum and part of cæcum markedly thickened and inflamed. Numerous enlarged mesenteric nodes.	No history; pain in R.L.Q. on pressure.	Temp. 99.4 to 100.4°. Nearly normal on 7th day.
12.	Sept.	11½	No	No	No	Append. normal. Term. ileum for 2″ œdematous and thickened with large lymph glands in immediate vicinity.	Abd. pain 2 days. Unable to walk. Pain in both lower quads. more on right. Nausea. No vomiting. Temp. 99 to 101.4°. Normal 6th day (had penicillin).	Muscle guarding both lower quadrants esp. right. Hyperæsthesia and rebound tenderness on right. Tenderness on deep palpation in right lower region. W.B.C. 12,100.
13.	Oct.	13	No	No	No	Appendix normal. Sub-mucosal lymphoid tissue abundant. Node—inflammatory hyperplasia. Last 4 to 5″ of ileum was dilated, thickened and somewhat reddened. Many glands in mesentery.	Lower abdom. pain, localizing in R.L.Q. Nausea.	Soft abdomen, some rigidity in R.L.Q. and deep tenderness in whole area. W.B.C. 11,200.
14.	May	14	Yes. Pain for part of a day before	No	No	Append. chronic product. with fæcoliths. Acute appearing mesenteric nodes.	General abd. pain. Localized in R.L.Q. Nausea. Temp. 99.4°. Normal on 4th day.	Tender in R.L.Q.
15.	Oct.	9	No	No	No	Appendix normal. Mesenteric glands enlarged.	Pain R.L.Q. 3 days. Nausea and vomiting 1 day. Epigastric pain Oct. 11. Vomited on 19th with pain in R.L.Q. Temp. 99.6 to 101.2°. Normal on 4th day.	Tenderness R.L.Q. Muscle guarding. Pain on rectal. W.B.C. 18,300.
16.	Oct.	9	No	No Tonsils out 2 yrs. ago Chest x-ray neg.		Appendix, subacute hyperplasia of lymph. Germinal centres. Mesenteric glands palpable.	Umbil. pain 1 week persistent but not serious. Became worse in R.L.Q. in band across abdomen. Vomiting 10 times. Temp. 101.2 to 102.8°. Normal on 7th day then up and down a little.	Tender across lower abdomen especially right lower. Rebound tenderness. W.B.C. 12,550; 5 days postoperative, W.B.C. 8,500.
17.	Oct.	8	?	?	?	Append. Chronic productive ileocæcal mesentery filled with glands of all sizes. Node normal. Small amount of free fluid.	Temp. 100.2 to 101.6°. Normal on 8th day. Tenderness and pain in R.L.Q. No nausea or vomiting until after admission.	
18.	June	18	Previous attacks in past yrs.	No	Glands in neck	Append. chronic productive. Several masses of hard yellowish glands in mesentery. Also meaty, enlarged glands.	Epigastric pain crampy, persistent. Became R.L.Q. No diarrhœa. Temp. 99.2 to 100.8° normal on 5th day. W.B.C. 16,350; sed. rate postoperative. 10/35.	Tender in R.L.Q. No rigidity.
19.	July	4	No	No	No	Clear fluid in abdomen. Mass of firm glands in ileocæcal angle. Terminal ileum enlarged the size of thumb, its vessels injected and walls slightly thickened. About 6″ from ileocæcal valve large Peyer's patch 1½ x ¼″, enlarged glands in relation to this. Appendix normal.	Mass palp. in R.U.Q. holds legs drawn up. Abd. wall flaccid. Mass in R.U.Q. Spasm of right rectum. (Thought to be retrocæcal appendix with rupture and abscess). Temp. 101° and up somewhat for 10 days.	
20.	Sept.	9	Yes 1 year before.	No	No	A considerable mass in the R.L.Q. involving lower end of ileum, the mesentery and cæcum. Numerous firm discrete reddish glands. Cuff of œdema lower third of ileum and adjacent cæcum. Pale in colour. Appendix normal.	Colicky abdom. pain. Nausea. Periumbil. becoming right-sided. Began day previous.	Temp. 102.8°. P. 96 tenderness and muscle guarding in R.L.Q. and suggestion of fullness there. W.B.C. 14,500.

the granulocytes from 66 to 82%. One feature which was common to nearly all was that the temperature remained elevated for 4 to 10 days and in one case for two weeks postoperatively. In this connection it is of interest that a case mentioned by McKechnie and Priestly[5] showed enlarged and inflamed nodes when re-operated on six weeks after the first laparotomy had revealed a mesenteric adenitis.

There are obviously all degrees of severity of the condition, from the really acute where a ruptured appendix was suspected in two cases (5 and 19), to those in which the diagnosis preoperatively was chronic appendicitis (1, 9 and 11). Other lesions with which this condition has been confused include intestinal obstruction, Meckel's diverticulitis, intussusception, mesenteric tumour, gastro-enteritis, pyelonephritis and salpingitis.

The clinical differentiation of the severe cases from acute appendicitis is certainly very difficult. It has been suggested that the line of tenderness may extend upwards and to the left along the line of the mesenteric attachment, and that rigidity is usually less than in appendicitis, Klein[6] suggested the test of shifting mesenteric dullness and tenderness when the patient is turned on his left side for 30 seconds. Colicky spasms which come and go which do not get progressively worse are said to be suggestive. None of these is pathognomonic, however, and most authorities now agree that laparotomy to rule out appendicitis is the only safe treatment in the acute cases. Ladd and Gross[7] say that this acute adenitis is the most common condition which must be differentiated from acute appendicitis in children. Postlethwaite[8] reported a correct diagnosis in 12 out of 44 cases (27%) preoperatively but appendectomy was done in 43 cases nevertheless.

The relation of inflammation of the appendix to the adenitis has been a much discussed problem. Anatomically, it is a possible cause of enlarged nodes as the appendiceal lymphatics drain into the ileo-colic chain. The pathological report of the 20 appendices removed in this series was that 6 were normal, 11 showed chronic productive appendicitis, 1 chronic recurrent appendicitis, 1 was subacutely and one acutely inflamed.

The absence of these large, firm reddish mesenteric glands in the great majority of cases of acute appendicitis is too well known to need stressing. The two do occur together at times, however. Of Postlethwaite's[8] 43 operative cases, 6 had acute appendicitis also and 37 showed no essential pathology. Tilley[9] reported 69 cases of which 11 had concomitant acute appendicitis. It may be, therefore, that appendicitis is one cause of mesenteric lymphadenitis or it may be that, conversely, the lymphangitis and lymphatic obstruction makes the appendix more susceptible to infection.

In the more chronic cases, differentiation from appendicitis may be easier. Where the local signs do not substantiate the clinical symptoms and where there is a history of a recent upper respiratory or gastro-intestinal infection or where another focus of infection is evident, in the appropriate age group, this condition must be considered. A period of observation may here obviate the need for operation.

The most interesting phase of this subject is, to my mind, the not uncommon finding of an œdematous condition of the lower ileum and occasionally of the mesentery and cæcum also, as described in the case previously quoted. In our small series of twenty cases, one reported œdema of the mesentery and six reported some bowel changes.

A survey of the literature reveals that many observers have noted such findings as are shown in our summarized cases. Tilley[9] records that 16 out of 69 cases of mesenteric lymphadenitis made mention of the fact that there was injection of the terminal ileum. Baker and James[19] stated that occasionally the terminal ileum was thickened and apparently œdematous. Rockey[10] in 1933 reported four cases of thickening of the terminal ileum with mesenteric adenitis in children. In two of these there was injection and reddening of the affected ileum but in the other two only lymphœdema. Bockus,[11] after quoting Holman's case of presumably regional enteritis in a child of 6 years in which the terminal ileum and cæcum were removed and no mucosal lesion found but only a diffuse œdema and fibrosis involving the mesentery and lymph nodes, states:

> "It was surmised from these observations made in a child that the process was primarily a lymphadenitis and that ulceration of the mucosa, when present, is secondary to the lymphatic obstruction and infection. Several observers have commented on the possibility of a primary mesenteric lymphadenitis as the initial lesion in regional enteritis. Surgeons have noted a diffuse inflammation of the terminal ileum in cases of acute mesenteric lymphadenitis. Perhaps in acute mesenteric lymphadenitis some permanent damage or obstruction of the lymphatic channels may occur, predisposing the devitalized intestinal mucosa to the inroads of intestinal organisms acting over long periods of time."

Erb and Farmer[12] in 1935 reported four cases of "acute ileo-colitis simulating appendicitis and characterized by œdema of the ileo-cæcal region and mesenteric glands". In the first case the cæcum and terminal ileum were markedly swollen, with an appearance like that of œdematous bowel following reduction of an intussusception of some hours' duration. The terminal 8 to 10 cm. of the ileum measured 4 cm. in diameter and was tense throughout. The lumen was practically obliterated. There was marked congestion of the serous surface except at the ileo-cæcal junction where it was grey-white in colour. The Peyer's patches felt through the walls were enlarged. Case 2 was essentially similar. In Case 3 the cæcum was solid with œdema and grey-white in colour, as was part of the ileum. Case 4 was that of a female child of 2½ years who had abdominal pain, distension and vomiting for four days before admission. She was drowsy and toxic, temperature 104°, white blood count 13,000. She had a slight head cold. She was treated conservatively but died on the fourth hospital day. Post-mortem findings were as follows: 250 c.c. of clear amber fluid were in the peritoneal cavity. There were small patches of loss of peritoneal lustre in the region of the terminal ileum and cæcum. There was marked œdema of 20 cm. of terminal ileum, cæcum and 8 cm. of ascending colon which were pale and grey-white in colour and doughy on palpation. The appendix was normal. There were large, pale red, œdematous mesenteric glands 1½ x 2½ cm. Œdema prevented passage through the ileo-cæcal valve. The mucosa of the affected ileum was only moderately injected. Peyer's patches were prominent, in places 2 to 4 mm. thick, the epithelium over them ulcerated and covered with a thick shaggy greyish-white pseudo-membrane. Some had a surrounding narrow zone of hyperæmia. Scattered between them were numerous swollen lymph follicles in the mucous membrane. The cut edge of the muscular portion of the wall was pale, grey-white, semi-transparent. The cut edge of a Peyer's patch was mottled dark red and grey red.

Microscopic sections through ulcerated ileum showed a thick layer of exudate composed of necrotic cells, fibrin, erythrocytes and bacteria. Lymph patches were only "necrotic shadows of their former selves". There was much œdema in the submucosa extending well beyond the ulceration. The adjacent mesenteric glands showed varying degrees of congestion and œdema with some necrosis of some of the smaller glands in the ileo-cæcal angle. Smear and culture in this case showed a Gram-negative bacillus. The authors suggested that these four cases might be early stages of acute regional ileitis and these, Crohn[13] has said, "are sometimes encountered at the operating table following an illness of 1 to 2 weeks and diagnosed as a rule as appendicitis. At this time the terminal ileum is found thickened, soggy and œdematous and the serosa is blotchy red. The mesentery of the terminal ileum is greatly thickened and contains numerous hyperplastic glands. Owing to the possibility of spontaneous resolution, resection has never been performed at this stage so that we have no knowledge of the intra-intestinal change present at this time."

It would seem that if these four cases were regional enteritis, then some of our series are also, but it would seem that they could be equally well classified as non-specific mesenteric lymphadenitis and that, in the case of the 2½-year old child who died of obstruction, we have a microscopic picture of the intra-intestinal lesion in such cases.

The experiments of Reichart[14] and Mathes showed that lymphatic and not vascular obstruction is the cause of the œdema in the bowel and that this is greatly increased when infection is added to the obstruction. They also found that the lymphatic changes were largely irreversible. Klein[6] has stated that mesenteric lymphadenitis is always preceded or accompanied by intestinal inflammation and the consensus is that most cases are due to absorption from the lymphatic tissue of the ileum of bacteria, their toxins and other decomposition products.

A. E. Brown[15] of Australia reported three members of one family affected within a week, two of whom showed enlarged glands and œdema of the cæcal or colonic wall at operation. He believed a common alimentary infection to be the cause.

Many observers believe that chronic stenosing regional enteritis is preceded by an acute ileitis at an earlier date. Is it also possible that non-specific mesenteric lymphadenitis is similarly a stage in the disease, occurring in the age period 5 to 20 years and followed in a small percentage of cases in 10 to 20 years by

stenosing enteritis? Both have enlarged glands, wherever in the bowel the enteritis may be found.

Sobel and Stetten[16] describe the microscopic pathology of the nodes in mesenteric adenitis as "not as striking as one would have been led to believe from their gross appearance at operation. In the main, the sinusoids were markedly dilated, with hyperplasia and often desquamation of the lining endothelial cells. The sinusoids were filled with increased numbers of lymphoid and endothelial cells. Frequently the lymph follicles were greatly increased in size, with hyperplasia of the germinal centres. The nodes showed evidence of œdema, with coagulated serum within the interstices of the stroma. Congestion and hæmorrhage were commonly found. In several instances there was marked hyperplasia of the reticulum cells. In others there was some replacement of the lymphoid elements by bands of connective tissue which in places had undergone hyalinization. Only rarely were there small areas of polymorphonuclear infiltration or necrosis. The capsule was frequently thickened, congested and infiltrated with round cells. In general, the feature of hyperplasia was much more marked than that of inflammation." No mention is made here of giant cells such as often occur in glands associated with chronic regional ileitis, though Wilensky[17] states that they do also occur in non-specific mesenteric lymphadenitis occasionally. It has been suggested that the presence of the giant cells depends on the severity and duration of the infecting agent.

In this connection, it is of interest to note that in two cases of surgically excised and pathologically confirmed regional ileitis which I came across in the Vancouver General Hospital records, the microscopic report on the associated glands was that of hyperplasia only.

It would seem therefore that non-specific mesenteric lymphadenitis and acute regional ileitis are very closely related, if they are not indeed stages of one disease, the exact etiology of which is as yet obscure.

To support my view, I came across the following statement by Crohn.[18]

"The presence of these guiding inflammatory nodes suggests the possibility that so called mesenteric lymphadenitis, as seen particularly in children, is none other than acute ileitis with minimal mucosal lesions and maximal lymphadenopathy. In the light of our increasing experience with ileitis the concept of an independent disease such as mesenteric lymphadenitis, distinct and apart from ileitis, will bear more careful study. The transition of acute lymphadenitis to chronic ileitis has never been observed, but is a reasonable potentiality."

The treatment, when mesenteric lymphadenitis is found, as in the acute stage of ileitis, is best limited to appendectomy. The value of sulfa drugs or antibiotics has not been well established but both are often used. In any case the prognosis is good. Postlethwaite[8] reports that of 371 cases followed, 67.9% were well after appendectomy. McKechnie and Priestly[5] state that 73.4% were symptom free after operation but that 24.1% had recurrent attacks of abdominal distress usually of a mild nature.

In conclusion, I would have the temerity to suggest for the increase of our knowledge of this intriguing subject:

1. That we have non-specific mesenteric lymphadenitis in mind in all cases of suspected appendicitis in the younger age group and if operation is performed a search be made for glands even when acute appendicitis is present.

2. That where glands are found, we make a thorough search of the nodes and bowel, removing a gland from near the bowel for biopsy and culture.

3. That we make accurate and full notes of our findings for the benefit of posterity.

4. That if any cases of proved mesenteric lymphadenitis come to operation again subsequently a search be made of the mesentery and bowel to see what changes have taken place.

5. That in any case of chronic regional enteritis where a previous appendectomy had been done, a search of the records be made to see if enlarged glands were present at the time of the original operation.

REFERENCES

1. CARSON, H. W.: *The Lancet*, 1: 259, 1918.
2. STRUTHERS, J. W.: *Edinburgh M. J.*, 27: 22, 1921.
3. WILENSKY, A. O.: *Med. Rec.*, 98: 220, 1920. WILENSKY, A. O. AND HAHN, L. J.: *Ann. Surg.*, 83: 812, 1926.
4. BRENNEMAN, J.: *Am. J. Dis. Child.*, 22: 443, 1921.
5. MCKECHNIE, R. E. AND PRIESTLY, J. T.: *Minnesota Med.*, 20: 370, 1937.
6. KLEIN, WM.: *Arch. Surg.*, 36: 571, 1938.
7. LADD, W. E. AND GROSS, R. E.: Abdominal Surgery of Infancy and Childhood, W. B. Saunders Company, p. 208, 1941.
8. POSTLETHWAITE, R. W., SELF, W. O. AND BATCHELOR, R. P.: *Am. J. Surg.*, 57: 304, 1942.
9. TILLEY, J. A.: *Am. J. Surg.*, 57: 472, 1942.
10. ROCKEY, E. W.: *Northwest Med.*, 32: 145, 1933.
11. BOCKUS, H. L.: *Gastroenterology*, Vol. 2, W. B. Saunders Company, p. 170, 1943.
12. ERB, T. H. AND FARMER, A. W.: *Surg., Gyn. & Obst.*, 61: 6, 1935.
13. CROHN, B. B., GINSBURG, L. AND OPPENHEIMER, G. D.: *J. Am. M. Ass.*, 99: 1323, 1932.
14. REICHART, F. L. AND MATHES, M. E.: *Ann. Surg.*, 104: 601, 1936.
15. BROWN, A. E.: *Surg., Gyn. & Obst.*, 65: 798, 1937.
16. SOBEL, I. P. AND STETTEN, D.: *J. Pædiat.*, 17: 305, 1940.
17. WILENSKY, A. O.: *Surgery*, 9: 787, 1941.
18. CROHN, B. B.: *Surg., Gyn. & Obst.*, 68: 314, 1939.
19. BAKER, A. H. AND JAMES, U.: *The Lancet*, August 17, 1946.

1401 W. Broadway.

PENTOTHAL SODIUM IN RELATION TO THE TOXIC AND CONVULSIVE STATES

R. J. Fraser, M.D. and R. M. Stringer, M.D.C.M.

Hamilton, Ont.

IN 1902 barbital was the first barbiturate to be introduced into medicine by Fischer and Von Mering, under the trade name of veronal. The second oldest barbiturate is phenobarbital, which was introduced several years later, under the trade name of luminal. Both these drugs have proved their worth. Following these, more than a score of barbiturates were synthesized, and have been used clinically. The chief advantage of several of the newer drugs as compared with barbital and phenobarbital is their shorter duration of action.

The latest advance has been the substitution in the barbituric acid molecule of sulphur for the oxygen on the urea carbon, and this has given rise to an entire homologous series of compounds, with distinctive properties, and possibly, special uses. These are the thiobarbiturates.

It is to the barbiturates that we wish to draw attention, with special reference to the toxic and convulsive states of pregnancy, and in some other acute conditions and illnesses. These are personal records and observations made at the Hamilton General, and St. Joseph's Hospital. The records on toxæmias of pregnancy were made mostly in the maternity divisions, while the observations on the acute illnesses were during our routine work in the operation rooms of our respective hospitals. These observations were made over a period of six years and commenced with pentothal sodium, and were followed up with kemithal sodium during the past three years.

For the past three years we have been on the lookout for cases in which to make a comparative study on the action of the two drugs. Our series has been small, because we did not have the numbers of toxæmias admitted that there were twenty years ago. Nevertheless, we were able to make certain observations, and we hope they will prove to be of value.

When a patient has been admitted to hospital in a toxic condition associated with pregnancy, and has been treated with all the conventional forms of therapy, with no improvement, and is given one of the thiobarbiturates and within a few minutes a definite improvement is observed, one may surmise that these thiobarbiturates might be used to advantage in the treatment of the toxic conditions associated with pregnancy.

Later on, we shall present case histories of patients that were stuporous, or entirely unconscious in the most extreme toxicity associated with convulsive seizures to the point of exhaustion, and given up to die, that have been led back to life by the simple administration of pentothal sodium. Some of these patients were anuric, others with albuminuric retinitis. In other words they were severe cases of toxæmia. The ones that we record have suffered no permanent anoxic sequelæ. At the same time, we are sure that not all cases will be so dramatically helped, but are confident that some lives will be saved, if the thiobarbiturates are given a trial.

Restorative measures should be commenced at the earliest possible time in order to forestall any untoward irreversible action, brought about by the convulsions, which may be associated with anoxia. If severe, these may permanently affect the central nervous system primarily, and the other systems secondly. Treatment of oxygen, and the support of the respiratory and circulatory systems.

The following cases are selected to show the use of pentothal as a beneficial therapeutic agent in convulsive and toxic states.

CASE 1

Postpartum status epilepticus.—Mrs. E.McC., aged 28. History of having epileptic seizures since the age of 15, especially at menstrual periods. The pain during these periods appeared to initiate the attacks. If the pain was relieved the attacks were controlled. Aspirin compound tablets were effectual in this respect. When her condition was properly diagnosed her physician prescribed phenobarbital gr. 1 four times daily which appeared to control this condition fairly well.

This patient was admitted to the Mt. Hamilton Maternity Hospital on January 27, 1943, at 10.30 a.m. and was delivered of normal male child at 4.05 p.m. the same day under an ether anæsthetic. The first seven days postpartum were uneventful during which time she received phenobarbital gr. 1, q.i.d. and nembutal gr. 1½ hs. On February 3, she complained of a painful area on the inner side of the left thigh and for the next few days was treated for a phlebitis. The above mentioned barbiturates were given more frequently to keep the patient comfortable. On February 12, at 2.30 p.m. sixteen days postpartum, the patient began taking epileptiform seizures and in the first two hours had five definite seizures, lasting 2 minutes. The temperature was 97.3 by axilla, pulse 116 and respirations 20. Sodium amytal, luminal, nembutal, phenobarbital, morphine sulphate were given to attempt control of these seizures. Intravenous glucose and magnesium sulphate were administered intermittently. Seizures continued, some lasting ¾ of an hour and the patient became cyanosed. However, between attacks she appeared quite rational. These drugs were continued at intervals during the next 24 hours but the patient's condition gradually became worse and on February 13, the convulsive seizures were almost continuous with the head thrown back and the

whole body curved backwards. She could not be aroused between attacks. Continuous oxygen with Boothby mask was administered and ice packs to the head advised. Chloral hydrate gr. 40 per rectum was added to the list of drugs. The patient appeared to be getting weaker although at this point her temperature was 98, pulse 120 and respirations 28.

She was now given 7 c.c. of a 2½% solution of pentothal sodium slowly in the intravenous set-up and the convulsions gradually subsided and the patient appeared to be resting more quietly, but the convulsions returned in about ½ an hour without any obvious improvement in the patient's general condition. On February 14, pentothal sodium was given twice in 4 c.c. doses and on each occasion the convulsions were temporarily controlled but returned without any general improvement in the patient's condition. On February 15 the patient appeared gravely ill. The temperature was 100.5°, pulse 140, respirations 36 and she was unconscious. It was decided to start pentothal sodium in continuous drip, and 1 gram of the drug to 1,000 c.c. of distilled water and glucose was set up.

This solution was allowed to run from 30 to 60 drops per minute in an attempt to control the convulsive seizures. From February 15 to 18 this pentothal sodium solution was run almost continuously in an effort to keep the patient quiet. On February 16 the temperature rose to 105 per axilla with an irregular pulse of 160, which at times became feeble but the convulsions were definitely under control and the patient appeared to be resting more comfortably. During this time she was completely unconscious and was receiving continuous oxygen with the Boothby mask. Towards the evening the temperature gradually began to fall and the pulse became more regular, and stronger. Next morning the temperature dropped to normal, rose again to 103° then gradually returned to normal.

In the three days previously mentioned 12 grams of pentothal sodium were given in the continuous drip. The following three days after the discontinuance of the drug the patient was quite restless but there were no definite seizures reported. On February 18, the patient began to mumble at intervals and by the 20th was able to talk coherently. She was discharged on February 27, 31 days following confinement, as fully recovered. This patient is constantly under her physician's care for the epileptic condition and has had no severe seizure to date.

CASE 2

Toxæmia and acidosis.—M.H., female, aged 6 years. This child was admitted to the Hamilton General Hospital at 9.30 p.m., December 26, 1947, with a diagnosis of acute appendicitis. Temperature on admission of 103° per rectum, pulse 120, respirations 24, white blood cells 18,500. The parents gave a history of the child being sick four days previously with a cold, during which time she had a poor appetite and appeared quite ill. She was booked for operation at 11 p.m. the night of admission. At 10 p.m. preoperative sedation of morphine gr. 1/12 and atrophine gr. 1/250 was given by hypo. On admission to the operating room, the child appeared quite bright but complained of being very dry and hot. The skin was quite dry and hot and the nurse who was preparing her in the operating room mentioned the fact that she seemed to be "burning up". An ethyl chloride induction with ether anæsthetic was the technique decided upon and the child was anæsthetized very easily. A 5% glucose in saline solution was started intravenously and oxygen with "hook" was administered at a rate of 4 litres per minute. The patient was well relaxed by the time the peritoneum was opened. Free pus was obtained and a fair amount of manipulation of the intestinal contents ensued. Somewhere at this point, about ½ an hour from the induction the anæsthetist noticed twitching of the eyelids. As the patient was breathing regularly and seemed quite relaxed he assured himself that the patient was not too lightly under, and immediately the ether was discontinued, the oxygen increased and the intravenous solution speeded up. The pupils were contracted and equal and patient's colour good. The twitching however continued and gradually increased to the face, neck and head. In about five minutes following the onset of the twitchings it had extended to both arms. By this time the patient was getting only oxygen. A mixture of oxygen and helium was administered by mask.

The pulse rose to 150, the respirations were about 36 and the colour was slightly cyanotic. The pupils had dilated slightly, regular and were reacting sluggishly to light. The condition was conveyed to the surgeon who unfortunately was having his own troubles finding the appendix and felt that he could not afford at that time to back out unless it was absolutely necessary. Very rapidly the seizures extended to the legs and in another few minutes the whole body became convulsive and literally bounced up and down on the operating table. The colour became a cyanotic grey and the pupils were widely dilated and fixed. The pulse was 160 and weaker. The breathing was jerky and irregular. The temperature at this point was 105° per axilla. At this stage 5 c.c. of a 2½% solution of pentothal sodium was administered intravenously. The result was striking; the convulsions gradually ceased and the breathing became quiet and regular. The colour however remained somewhat cyanotic even with the continued mixture of helium and oxygen. The surgeon finished the operation about 12.20 a.m. and by the time the patient was ready to be sent back to the ward at 12.35 the colour was much better but the pulse was still about 160 but regular and strong. The temperature was still 105 per axilla. A 2½% solution of pentothal sodium was sent to the ward with the instruction to give it again if any signs of convulsions were observed. Slight twitchings were noticed of the arms and legs about 1.10 a.m. and 4 c.c. of pentothal sodium were given. Another 4 c.c. were given an hour later. Oxygen was continued throughout the rest of the night as the patient remained unconscious. She regained consciousness at 6 a.m. and was able to take some fluid by mouth and smile, apparently none the worse for her grave condition a few hours previously.

By noon the following day her temperature was down to 102° per rectum, pulse 130 and respirations 32. Five days later she developed an appendiceal abscess which was opened and drained under the very same anæsthetic technique as previously used without any complication. She was discharged as completely well January 14, 1948.

This is a case where a very sick child, dehydrated and toxic, develops an acidosis with heat retention under anæsthesia. This child was quite probably saved by pentothal sodium from developing a fatal cerebral œdema.

CASE 3

Postpartum eclampsia.—Mrs. H.G., aged 27. Para 0, gravida 2. Admitted to Mt. Hamilton Maternity Hospital October 21, 1947, in a pre-eclamptic condition. This patient had previously been treated in hospital at 4½ months for œdema and albuminuria. At 7 months sent to hospital again for œdema, albuminuria and hypertension. Rest and diet during these short stays in the hospital improved her condition considerably. At 8½ months, admitted with severe toxæmia; œdema, 3 plus albuminuria, blurred vision and blood pressure 190/120. From October 21 to 30 was treated again for the toxæmia and medical induction of labour was decided upon. On October 30, at 11.37 a.m. under gas anæsthesia living twins were delivered without complications. The patient regained consciousness shortly following the repair of the episiotomy and talked about her twins to the physicians in attendance. Pulse 100, respirations 20 at this time. Blood pressure was not recorded. At 1 p.m. she was taken back to her room from the delivery floor apparently in good physical condition, and was given morphine sulphate

gr. ¼ for pain in the perineal area. About 3 p.m. she became restless and confused. At this time her pulse was 100, good volume, respirations 30 and blood pressure 190/110. About 5 p.m. she began to have convulsions, the first convulsion lasting 2 minutes.

Sodium amytal gr. 3 was given intravenously. She became unconscious and began having intermittent convulsive seizures lasting 2 and 3 minutes. The interval between convulsions became shorter and the seizures more intense. At 7 p.m. the patient became quite cyanosed and continuous oxygen by Boothby mask was administered. The patient had not voided since delivery and a catheter was inserted in bladder without results. During the next two hours every means was attempted to control the convulsions. Sodium amytal, seconal per rectum, morphine sulphate, heroin; 50% dextrose and 10% magnesium sulphate were administered. At 8 p.m. the patient's condition was rapidly becoming worse. The pulse was 140, the volume much weaker, respirations 36 and irregular. The pupils were dilated and fixed. At 8.50 the convulsions were almost continuous, the breathing became laboured and stertorous. The pupils were widely dilated and fixed. The pulse remained about 150 and very weak. Blood pressure about 50 systolic and temperature 104° per axilla. At this point the anæsthetic service was consulted regarding the remote possibility of controlling these convulsions. As the patient appeared to be rapidly approaching the irreversible state one hesitated to give an anæsthetic drug especially when there was evidence that the kidneys were non-functioning. However a 1½% solution of pentothal sodium was made up and 3 c.c. was injected in the intravenous glucose solution already running at approximately 9.25 p.m. The convulsions gradually subsided. At 9.35 p.m. 2 c.c. more of the 1½% pentothal sodium solution was injected. In a few minutes the patient became relaxed, the breathing appeared more regular and her colour began to lose the cyanotic appearance. At 10.18 p.m., 11 ounces of urine were obtained by catheter. Pulse 128, strong and regular. Temperature 102° per axilla and blood pressure 180/120. No evidence of convulsive seizures. At 12.15 a.m., October 31, the temperature per axilla, was 99, pulse 132, and respirations 32. No evidence of convulsions but she became somewhat restless. Heroin gr. 1/12 and seconal gr. 3 per rectum were given. No more pentothal sodium was administered. The patient's condition gradually improved through the remainder of the night. The urinary output increased gradually although she was still unconscious. No more medication was given, but oxygen by Boothby and intravenous glucose in water was continued. About noon on October 31st the patient regained consciousness and appeared quite clear in her mind but could not remember anything that happened following her return from the delivery room, about 18 hours previously. At 4 p.m. the same day the pulse was 100, respirations 22 and blood pressure 130/100. The fluid output in the past 12 hours was about half the intake. She continued to improve and was discharged as well on November 15th, 16 days postpartum.

This interesting case merits some discussion. As has been shown by these records the remarkable improvement began almost immediately following the administration of a very small amount of pentothal sodium. Only 5 c.c. of 1½% solution of pentothal sodium was given and the patient's condition steadily improved from a very grave state.

CASE 4

Postpartum convulsions.—Mrs. P.K., aged 27, para 2, gravida 3. Admitted to Mt. Hamilton Maternity Hospital in labour at six months. Feet and ankles œdematous. Was in labour for 4½ hours during which time received nembutal, seconal and demerol at intervals. At 3.20 p.m. was delivered of macerated twins under spinal anæsthesia, 50 mgm. novocaine. Patient appeared to be in good physical condition following the delivery. Pulse 80, respiration 20, blood pressure 96/70.

Shortly after being returned to her room, she complained of a headache and was given 10 gr. of A.P.C. and C. At 6.15 p.m. she suddenly began to have twitching of the entire body, lasting about 10 minutes and became slightly cyanosed; 500 c.c. of 25% glucose solution was started intravenously. Blood pressure at this time was 95/65. Seconal gr. 1½ given, and 2 c.c. of 50% magnesium sulphate intramuscularly. Patient was not unconscious but appeared somewhat confused, and following the convulsion seemed to rest quietly. At 7.00 p.m. had another convulsive seizure which lasted nearly as long as the first. At 7.10 p.m. 5 c.c. of 2½% pentothal sodium was given intravenously. A catheter was placed in the bladder and 8 c.c. of urine was obtained which contained 3 plus albumin. Patient went into a quiet sleep for 15 minutes and awoke feeling much brighter but still complained of a slight headache. Blood pressure at 8 p.m. was 150/95, pulse 80, respirations 22. At 9 p.m. complained of severe frontal headache and at 9.05 p.m. had another convulsive seizure but less severe and lasted about 3 minutes; 10 c.c. of 2½% pentothal sodium solution intravenously was given and the patient relaxed rapidly and slept quietly for about ¾ of an hour. On regaining consciousness she complained of a slight headache and appeared slightly restless but from there on there were no more convulsions. At midnight the pulse was 90, respirations 22 and blood pressure 135/95. Catheter specimen was negative for albumin from this time on. She was discharged well, seven days postpartum.

CASE 5

Mrs. P., aged 35, para 0, gravida 2, admitted to Casa Maria Maternity Hospital, on September 19, 1947 in an eclamptic condition. In May and August there was slight œdema of the lower extremities. The highest blood pressure was 130/96. In September the condition became worse and on September 8 the blood pressure was 132/70 and the urine was negative for albumin. On September 15 the blood pressure was 150/100 with œdema of the lower extremities and some cardiac embarrassment. The urine was negative. On September 17 the blood pressure was 160/90, red blood cells 3 plus, urine was diminished, albumin 3 plus, the patient was toxic, with headache. She was given intravenous fluids at home with fruit drinks, and remained about the same until the 29th when she was admitted to hospital where she received fluids by vein and mouth. On the 21st she was given kemithal sodium drip 5 gm. to the litre, and as this was given slowly, there was an increase in the urinary output; the toxæmia lessened and the specific gravity decreased. She improved gradually and was eventually delivered of twins without complications.

CASE 6

Mrs. L., aged 26, para 0, gravida 1. Admitted to Casa Maria Maternity Hospital, April 2, 1947, in a toxic pre-eclamptic condition. Upon admission, her blood pressure was 202/120, œdema 3 plus, albuminuria, hyaline and granular casts and red blood cells in the urine. She had marked albuminuric retinitis and scanty urine. She was one month premature, and was delivered about 4 hrs. after admission under lumbar anæsthesia of a baby boy. Upon delivery, she was given a kemithal sodium drip 5 G to a litre of glucose in distilled water. There was a premature separation of the placenta, and with interference with the circulation of the baby. The baby required resuscitation with the inhalator. April 3, the mother's condition was improving, urinary output increased, and the blood pressure now was reduced to 150/110. In this case there were muscle twitchings, but no frank convulsions. On April 4, the baby expired, and the cause of death was given as secondary to the severe toxæmia of the mother. April 6, the mother was

allowed home and was apparently well. Since this experience she has again become pregnant and had a baby girl with no untoward results.

The last two cases are more or less types of the toxæmias of pregnancy that we have endeavoured to treat with kemithal sodium, to see if there were any beneficial results from this form of therapy. In our opinion, we think that the results are more or less comparable, and that kemithal sodium is equal if not superior to pentothal sodium in that clinical observation shows its sulphur contents may be greater than those of pentothal sodium.

Apart from the above case reports we were obliged to use pentothal sodium for the treatment of intravenous procaine convulsive seizures. This was not a simple procedure of dispelling convulsions by a small dose of pentothal, but large doses were employed until the detoxification process was completed by the body, before the discontinuance of the drug could safely be done.

We were not able to find out the sulphur content of pentothal sodium and kemithal sodium. We were informed that they were the same, but one would suspect that the latter contained larger amounts. Certainly one would suspect this by the odour of kemithal in comparison with pentothal. On the other hand larger doses of kemithal can be given without the respiratory depression and consequently more of the sulphur radicle.

Whilst we cannot explain all the end results, we think that the thiobarbiturates are possibly responsible for the results that we have recorded. The two thiobarbiturates that we have employed were first pentothal sodium, and later kemithal sodium. We think it is reasonable to assume that the sulphur radicle may be beneficial in some of the toxic and convulsive states.

BILATERAL PNEUMOTHORAX COMPLICATING THYROIDECTOMY.—During the course of a sub-total thyroidectomy for moderately enlarged, nontoxic, diffuse nodular goitre, a hissing sound was heard, and the patient became cyanotic with laboured respiration. A diagnosis of bilateral tension pneumothorax was made, and later confirmed by x-ray. The patient responded well to pleural decompression. Moriarty, G.: *Harper Hosp. Bull.*, **7**: 301, 1949.

ETIOLOGICAL SIGNIFICANCE OF PULMONARY CALCIFICATIONS AT UNIVERSITY OF TORONTO

T. G. Heaton, M.B., F.C.C.P.*

Toronto, Ont.

IN the 1948 routine radiological chest survey at the University of Toronto, 8,144 films were taken and 122 of these showed pulmonary calcifications. This is an incidence of about 1.5%. This incidence is to be compared with Beadenkoff's[1] figures of 20% of films with pulmonary calcifications in the Mississippi Basin and "less than 10%" in regions just south of the Great Lakes.

In the past five years it has been increasingly realized that conditions other than tuberculosis can cause pulmonary calcifications; and in particular, that calcifications can be caused by fungus infections of lung, such as coccidiomycosis, aspergillosis, and histoplasmosis.

Studies of skin sensitivity to coccidioidin, to tuberculin, and to histoplasmin have been made[1] and correlated with pulmonary calcification as occurring in various parts of the United States. The percentage of reactions to coccidioidin was found to vary from 0 to 11% according to the region surveyed; and the greatest incidence of skin sensitivity to coccidioidin was found in the South Western and Middle Western States.

The percentage of reactors to tuberculin was found to vary from 19 to 32% within the United States (among students at the University of Chicago). The available figures for the University of Toronto are derived from a survey of female students only and show that in 1947 of 1,428 students 19% reacted positively to tuberculin.[2]

The percentage of reactors to histoplasmin was found to vary from 70 to 3.7% among the Chicago students, according to the geographical distribution of the domicile of these students. Skin sensitivity to histoplasmin was most frequently found in students from the Mississippi Basin and corresponded quite closely with the incidence of pulmonary calcifications. The figure of the incidence of histoplasmin sensitivity *among cases showing pulmonary calcifications* at the University of Toronto is provided in this resport, and is *not* comparable to the above figures, because at Chicago all students were

* Clinician in charge of Tuberculosis, University of Toronto Health Service.

tested, not only those with pulmonary calcifications.

Material and method.—This report is concerned with the group of students found at the University of Toronto in 1948 to have pulmonary calcifications shown in an x-ray film of the lungs in one (the largest) section of the Health Service. There were 77 such cases. All were recalled to the Health Centre by letter, and 63 actually attended and form the group here reported.

Each student was given 1/10 c.c. intradermally of histoplasmin "H 40" supplied by the U.S. Public Health Service, and in the other arm was given 1/20 mgm. tuberculin supplied by Connaught Laboratories Toronto. The tests were read in 48 hours. If the tuberculin test was negative, 1 mgm. was given and read in 48 hours. The tuberculin test was not recorded as negative unless negative to 1 mgm. Reactions both to tuberculin and histoplasmin were recorded as negative unless 5 mm. in diameter or more.

Tuberculin syringes were used. The syringes used for the histoplasmin tests were new syringes and were not used to give tuberculin.

Results.—Table I shows the results obtained.

TABLE I.

RESULTS OF SKIN TESTING

	Cases
Tuberculin positive, histoplasmin negative	20
Tuberculin positive, histoplasmin positive	13
Tuberculin negative, histoplasmin positive	23
Tuberculin negative, histoplasmin negative	7
Total	63

It is interesting that only 33 of these 63 cases of pulmonary calcification were tuberculin positive, and that 36 cases reacted to histoplasmin. The numbers involved are too small to make a geographic survey of much value, but it was noted that positive reactors to histoplasmin included individuals from all Provinces of Canada except Newfoundland and Prince Edward Island.

X-ray appearances. — An attempt was made to find some characteristic by which calcification due to histoplasmosis might be distinguished from that due to tuberculosis in the x-ray films. Table II shows the results obtained.

In this table calcifications are classified both according to their appearance and distribution on the P-A x-ray film. So far as distribution is concerned, "upper half" refers to calcifications at or above the 4th anterior rib, and "lower half" to the lung below this level. The points that may be noted in this table are:

1. Bilateral calcification is more often associated with a positive histoplasmin test than with a positive tuberculin test. (Comparable figures in the table are bracketed.)

2. The irregularly shaped calcifications are more often associated with tuberculin than histoplasmin positivity. (The comparable figures in the table are italicized.)

3. Upper lobe localization of calcification is associated with a positive tuberculin test. Edwards, Lewis, and Palmer[3] in their much larger series found that, "Among tuberculin reactors, the infiltrates are found to be localized in the upper portion of the chest. Among histoplasmin reactors the infiltrates are scattered generally throughout the lung fields."

DISCUSSION

It is apparent that pulmonary calcifications are often associated with a positive skin reaction to histoplasmin. If such lesions are actually caused by histoplasmosis, then earlier lesions similarly caused and which may be expected to have the radiological appearance of a fresh infiltrate, probably are to be found occasionally and could be readily mistaken for tuberculosis or for one of the other fungus diseases of the lung. Such small infiltrates have been reported as related to histoplasmin sensitivity by Edwards, Lewis, and Palmer.[3] These authors studied x-ray films of 12,803 student nurses and found 12 with "poorly circumscribed infiltrates" who reacted to histoplasmin but not to tuberculin. None of these 12 lesions showed progression of disease. Ten clinical

TABLE II.

X-RAY APPEARANCES

Skin test	*Single round*	*Single irregular*	*Multiple round*	*Multiple irregular*	*Round lung and hilus*	*Irregular lung and hilus*	*Bilateral*	*Upper half of lung*	*Lower half of lung*	*Upper and lower*	*Total cases*
Tbc. neg.; Hist. neg.....	4	0	1	0	2	0	0	1	6	0	7
Tbc. neg.; Hist. pos.....	8	*0*	0	*0*	9	*0*	(6)	9	13	1	23
Tbc. pos.; Hist. pos.....	1	1	0	0	6	2	3	6	7	0	13
Tbc. pos.; Hist. neg.....	7	*1*	2	*1*	6	*2*	(1)	9	9	2	20
Totals.....	20	2	3	1	23	4	10	25	35	3	63

cases of pulmonary histoplasmosis were observed by Bunnell and Furcolow[4] in Kansas City, with at least two complete recoveries and five deaths. Krug and Glenn[5] state that "Since 1905 when the first cases were reported in the Canal Zone only 82 reports of histoplasmosis are to be found. All these patients died of the disease."

It would appear therefore that histoplasmosis, like tuberculosis, normally heals without causing clinical illness, but is at times a progressive and fatal disease. It must therefore be treated much as tuberculosis is treated.

Summary and Conclusions

A total of 122 cases showing pulmonary calcifications radiologically was found by an x-ray survey in which 8,144 chest films were taken of students, male and female, at the University of Toronto in the fall of 1948. This is a much lower incidence of calcification than is found in most parts of the United States.

Sixty-three unselected individuals showing pulmonary calcifications were skin tested; 36 of these reacted to histoplasmin; 33 reacted to tuberculin. This, together with a growing weight of evidence in the literature, suggests that pulmonary calcification is often due to *histoplasma capsulatum* rather than to *M. tuberculosis.* Certain other fungi are also thought to cause pulmonary calcifications.

Because histoplasmosis is a disease closely resembling tuberculosis, treatment and control measures will be very similar in the two diseases. For practical purposes there is nothing to be gained by attempting to differentiate between the two diseases in the stage of calcification. But histoplasmosis should be kept in mind in the differential diagnosis of persistent pulmonary infiltrates in Canada as in the United States.

I wish to express my appreciation to Dr. C. D. Gossage, Director of the University of Toronto Health Service, for his unfailing interest and assistance in this study.

References

1. Beadenkoff, W. G., Loosli, C. G., Lack, H., Rice, F. M. and Slattery, R. V.: *Pub. Health Rep.*, 64: 17, 1949.
2. Stewart, F.: Women's Health Service, University of Toronto, Personal communication.
3. Edwards, L. B., Lewis, J. and Palmer, C. E.: *Pub. Health Rep.*, 63: 1569, 1948.
4. Bunnell, I. L. and Furcolow, M. L.: *Pub. Health Rep.*, p. 299, March 5, 1948.
5. Krug, E. J. and Glenn, H. R.: *Lancet*, 68: 206, 1948.

210 St. Clair Ave. W.

Résumé

Il s'agit d'une étude faite à l'université de Toronto sur 122 cas de calcifications pulmonaires trouvées à l'examen de 8,144 clichés de dépistage. On fit des épreuves cutanées à 63 de ces 122 cas; 36 réagirent à l'histoplasmine et 33 à la tuberculine. Ces faits concordent bien avec ce qui a été trouvé aux Etats-Unis et ailleurs i.e. que le calcifications pulmonaires sont souvent dues à *Histoplasma capsulatum* plutot qu'à *M. tuberculosis.* Au point de vue pratique il ne sert à rien de différencier les deux puisque le traitement est le même, cependant on doit toujours penser à l'histoplasmose dans le diagnostic différenciel des infiltrations pulmonaires persistantes. Yves Prévost

IMMUNIZATION IN PRACTICE*

G. M. Little, M.D.

Edmonton, Alta.

IN 1944, at the 75th annual meeting of this Association, the Committee on Economics reported under the heading of "Principles Relating to Health Insurance" as follows: "Each province should be served by an adequate Department of Public Health, organized on the basis of the practising physician taking an active part in the prevention of disease". This recommendation, I take it, includes immunization.

The first problem I would discuss is, "Should immunization be left to the practising physician, or should it be left to the public health agency, or should both be doing this work?" A complete answer to this question is not immediately obvious. Let us consider what develops when it is left to the practising physician alone.

I am well aware that some physicians are specially interested in this matter, and do excellent work in their community; but we are speaking now of the profession generally. The average physician has many unforeseen calls upon his time. Many find it difficult to take a day, or even a half day, away from the urgencies of practice to inoculate groups of children in the schools, particularly isolated rural schools. These visits must be scheduled a reasonable time in advance, and if one is alone in practice, such schedules may be difficult to meet.

On the other hand, to attempt to get the babies, pre-school and school children from the countryside over to come to the doctor's office for this purpose is likely to result in failure to

* Read before the Eightieth Annual Meeting of the Canadian Medical Association, Section on Preventive Medicine, Saskatoon, June 15, 1949.

immunize a sufficient percentage to protect the community against epidemics. Experience has convinced many of us that the closer we bring this service to the doorstep of each citizen, the higher the percentage of children reached. Furthermore, to bring large numbers of children for immunization requires organization and publicity. The practising physician has little time for organizing campaigns, and is reluctant to undertake adequate publicity. He dislikes being accused of drumming up grist for his own mill. Many of us have found this a real inhibition in private practice, although I would suggest that our profession is much too reticent regarding the accomplishments of our own science. The public health authority on the other hand, has no such inhibitions. He can take time to organize campaigns, and as the necessary publicity brings him nothing—except work—he is not likely to be accused of furthering his own personal welfare.

These are some of the reasons advanced by those who advocate immunization being done by the public health authority.

Then, too, some physicians appear reluctant to undertake immunization. It may be that it is not convenient to maintain office refrigeration for storing biological products. It may be that some feel impelled to direct their patient to the public clinic where this service is free. At any rate, many evince little interest in doing this work themselves. To maintain a high level of immunization requires a fairly persistent effort to educate our people to the need, and organization to make it convenient for them to meet that need. The suggestion that this whole matter be left entirely to the public health authority, however, also presents shortcomings.

The health officer, who must continue to think in terms of all the people of the community, cannot hope to gain the confidence of the individual as does the family physician. The latter's influence, based upon intimate personal service, is something which no other service in the community can attain. It places him in a position to advise the family regarding health matters more effectively than is possible to any one else. He dispenses a wide variety of protective advice and procedure to his patients as a matter of course. One might well ask, "Why should the further protective procedure of immunization be eliminated from his duties?"

The family physician is said to be a rapidly disappearing character. Perhaps according to our conception this is so. However, I have occasion to ask many scores of our citizens each year, "Who is your family doctor?" Except in the case of a very new resident, the question is almost invariably answered by promptly naming one of the physicians of our city. In the eyes of the layman, at any rate, the family physician is still very much on the job. Now it is true that frequently he names a physician whom we know as a specialist. To the layman, the family physician is often simply the doctor he knows best, and who will at least direct him when illness strikes the family. I dwell on this point to lend force to the suggestion that the specialist also, who is often looked upon in this light by the layman, has a responsibility to at least disseminate information regarding immunization to the families he serves.

Time will not permit thorough discussion of this problem; but one is likely to conclude that for the present we should look to both practising physician and the health authority to see that immunization is adequate in every community.

I believe we must recognize public health as something not apart from the problems of medicine, but as an integral part of the organization trying to work out those problems. I believe that the health department should be considered as supplementing and supporting the efforts of the physician in community health matters; and I also believe that such preventive procedures as immunization and physical examination of school children should be carried out largely by the practising physician, leaving to the public health authority the duties of public education, and planning and organizing schedules of work which may be carried out by the physicians of his district. Furthermore, as this service must be freely available in order to reach everyone, and as it is a protection to the community generally, I believe that it should be paid for not by the individual, but jointly by the municipal and provincial governments concerned on the basis of work done.

I am saying, in effect, that the private physician should be a responsible part-time member of the public health organization, carrying out

certain important public health measures in co-ordination with the medical health officer and his staff. Such an arrangement offers an immediate partial solution to such problems as large areas without organized public health services, and a marked shortage of trained health officers. With such assistance, a single health officer could carry out the administrative work for a much larger area than at present. From the standpoint of the physician, it might be a useful and pleasant experience to make such a wide contact with the healthy children and adults of his community, as well as the sick.

But more important, I believe that from such a co-operative effort could be evolved a more effective plan of preventive medicine than we have yet seen. There still seems to be that line of demarcation between curative and preventive medicine in the minds of many physicians as well as laymen. If this excludes such duties as immunization from private practice, then I say the line is drawn in the wrong place. I shall go on to discuss certain details of immunization in practice.

First, I would suggest that it is not reasonable to immunize any individual without giving to him a certificate of immunization. Some provinces supply the physician with forms for this purpose. Frequently we are confronted by the mother who brings her child for immunization, but not having been given a certificate, she does not know what he has already been protected against in some other centre. Also, when the physician has a suspected case of diphtheria or whooping cough, it may be of the greatest value to know what protection the child has had, and when. It is our experience that most mothers do not lose these certificates, as one might expect; and they are valuable when the child is brought for further immunization or for reinforcing doses. Furthermore, these certificates may be required when travelling outside our country, and in some cases when seeking employment within it.

We have found exceedingly useful and educational a single mimeographed sheet outlining briefly the various immunization procedures, describing such reaction as may occur in the occasional child who is sensitive to the materials, and giving instruction as to what to do if this should happen. Being forewarned, the mother is not perturbed; and being instructed as to what to do about it, she does so instead of ringing your telephone. It is seldom that the child is not as well as ever by the following day. New mothers especially appreciate having such an instruction sheet supplied to them. I believe that a suggested immunization program for the child should be presented to every mother following her confinement. She appreciates highly this interest in the future of her baby.

I would make only one other general observation. With children, we avoid many a battle royal by keeping our hypodermic needles carefully sharpened at all times.

Typhoid immunization.—In civilian life it has been demonstrated that adequate sanitary supervision of water, food and general conditions will control typhoid fever. There are exceptions, however. Those people going into the far north, or other areas where sanitation is poor, should be immunized against this disease. Nurses and hospital attendants who may contact unknown carriers in an intimate way should be immunized, as should those who have to live in contact with a known carrier. While it is felt that typhoid vaccine provides a fair immunity for a period of two years, a known or possible hazard demands an annual reinforcing dose. One has observed typhoid develop less than two years following an apparently adequate immunization.

Smallpox immunization.—Smallpox immunization is still a universal need. The fact that we see little smallpox in our country today promotes an indifference which is our greatest problem in protection. The deadly result of a slackening of effort in this connection has been demonstrated too often to require elaboration. I believe that every child should receive this protection between two and five months of age. Any disturbance from a "take" will be less then than later, and this immunization is achieved before it is time to begin inoculation against other diseases. It is desirable to repeat this every five to seven years to assure maintenance of full protection.

It must be remembered that if smallpox vaccine is kept at room temperature, even a few hours may inactivate some tubes of this material. A few days without refrigeration gives numbers of tubes with which you may get no "take".

Diphtheria immunization.—Many of you will recall what a wicked epidemic disease diphtheria can be. Obviously, the only thing which prevents it from returning in all its old time fury is the general use of diphtheria toxoid. The

occasional case which still occurs is a potent reminder that we cannot let down our guard for a moment.

We know that toxoid may not produce an active immunity if given during the first few months of life. It may well be started at the age of five or six months. The usual three doses give such a high percentage of immune individuals (over 90%), as to mark this as a very satisfactory preventive. Severe reaction in young children is so rare as to be negligible. In older children reaction may be guarded against by using the reaction test. However, when we can toxoid all, or nearly all, children at six months, with a reinforcing dose at the beginning of their school life, diphtheria will be close to extinction; and we have little concern regarding reaction at those ages. The number of doses may be reduced by using alum precipitated toxoid; but the lump which often remains at the site of inoculation for several weeks, and the occasional abscess formation, have prevented this material from becoming as popular as it otherwise might be.

Whooping cough immunization. — Whooping cough is at present the chief killer amongst our communicable childhood diseases. You are familiar with the mental and physical infirmities which this disease leaves with some of its survivors. Also, we have yet no effective specific remedy to offer, although aureomycin shows some promise. These facts, I think, accentuate our responsibility for seeing that protective inoculation is made available to every child in our land, and that parents are made familiar with the need for this protection.

The whooping cough vaccine we now have is effective. In my own city we began the use of the Sauer-type vaccine in the latter part of 1942. The case-rate for whooping cough for the past six years is less than one-half the rate for the previous ten years. In 1947, our last peak year, the rate was approximately one-third that in each of the last three peak years before immunization. Furthermore, this was accomplished during a period of rapid increase in our population, and a very formidable increase in congestion of our living accommodation. A number of our physicians were quick to recognize the value of this vaccine, and were in good part responsible for this happy result. The advent of a combined diphtheria toxoid and whooping cough vaccine made the latter easy to introduce.

The public had already been trained to bring children for diphtheria toxoid. Mothers are well aware of what a vicious disease whooping cough can be; and when informed that their child can be immunized against both these diseases together, they are quick to accept it. Of some 2,800 babies and pre-school children given diphtheria toxoid in our city last year, 2,700 accepted the whooping cough vaccine at the same time. There is satisfactory proof that the protective value of both these antigens is increased when given together. Owing to the inability of numbers of infants to develop protective antibodies during the first few months of life, we begin whooping cough immunization at five months of age. If an attempt is made to immunize infants earlier than this, I believe that parents should be warned that further immunizing doses should be given during the latter half of the first year. Otherwise, we have no assurance that any particular child has developed his immunity.

Some soreness and moderate reaction at the site of inoculation is common. Moderate fever and restlessness during the night following the day of inoculation is also fairly common, but chiefly with the first dose. However, I have yet to see a reaction from this source which was alarming to the physician, and seldom to the mother if she has been forewarned, and instructed in the use of hot compresses and perhaps a little aspirin. It is the rare child which is not as well as ever the following day. We recommend a single reinforcing dose one year, and again two years following the initial course of immunization. This assures a high level of immunity during those early childhood years when this disease is so deadly.

Tetanus immunization.—Tetanus is very rare in our part of the country. Yet it has occurred, and is therefore one of the remote but serious possibilities to worry the surgeon in every case of wounds, particularly those acquired on our farms in contact with livestock. Tetanus toxoid is an effective prevention. Reactions from its use are negligible. It can be given satisfactorily with diphtheria toxoid and whooping cough vaccine, or with typhoid vaccine if desired. It is available in both these combinations, and we advocate its use.

Scarlet fever immunization. — Immunization against scarlet fever is not so satisfactory as in the case of those diseases mentioned. Five doses at weekly intervals is a laborious procedure for the child, the mother, and also the physician. The resulting percentage of immunized children, according to the Dick test, has been reported in various groups observed as between 70 and 80%. The multiplicity of strains of the scarlet fever streptococcus is in itself one of the obvious reasons for the difficulty in producing a highly effective antigen.

On the other hand, there is considerable accumulated evidence of value in this procedure. In my own city a study of some 7,000 immunized children compared to approximately 8,000 unimmunized children over the same seven-year period showed the morbidity rate of scarlet fever amongst the unprotected as twelve times that reported in the protected group. This is supported by similar observation in other centres.

The unpopularity of this procedure stems. I think, from several things. The percentage of children developing immunization from the five doses recommended is not as high as those resulting from routine immunization in some other diseases. Also, some local and general reaction is not uncommon from the administration of scarlet fever toxin. However, in our experience most marked reactions can be avoided by carefully gauging subsequent doses according to the reaction of each previous dose. Here again, forewarning of the mother often saves the doctor a telephone call.

The objection has been raised that scarlet fever immunization results in numbers of cases so extremely mild that they are difficult to identify. This is hardly a tenable objection. Obviously, if a child is going to have scarlet fever, the milder the better, even though it may be some trouble to the physician in the matter of diagnosis. I doubt if such mild cases add materially to our total number of cases, and there is little evidence to suggest increased complications from such cases. To these objections may be added, perhaps, that so many successive inoculations often produce a disturbed and vociferously objecting young patient who makes a nuisance of himself in office or clinic. Nevertheless, the available evidence suggests that immunization against scarlet fever is a useful procedure.

I would conclude with a suggestion and a prediction. I would suggest that the practising physician should think of these communicable diseases in terms of prevention as well as treatment, and that he has a definite responsibility, so far as his influence may go, to see that every child in the families he serves is protected. I would predict that when our family physicians generally conceive the desire to undertake the responsibility in a comprehensive manner, and if an effective plan for such is outlined and advocated by the organized medical groups, the problem of immunization will quickly be in the hands of the private physician—where it belongs.

Civic Bldg.

RÉSUMÉ

L'auteur discute s'il faut laisser l'immunisation au médecin praticien, ou plutôt la confier entièrement à un service d'hygiène organisé. L'expérience a montré que le médecin praticien le plus souvent n'a pas le temps d'organiser des séances d'inoculation en groupe et que si ces séances n'ont pas lieu beaucoup d'enfants sont privés de cette protection. Par contre un service d'hygiène n'a aucun scrupule à faire de la publicité et prendra le temps de visiter les écoles. Cependant bien des médecins s'acquittent admirablement de leur tâche dans leur ville ou région; l'auteur croit que l'immunisation doit se faire avec la collaboration d'un service d'hygiène et des médecins praticiens. Le service d'hygiene suppléera aux efforts des médecins dans ces questions de santé. L'examen périodique des enfants et l'immunisation dans les écoles devront être faits par le médecin tandis que la propagande et la publicité seront du ressort du service d'hygiène. L'auteur recommande la rémunération des médecins par les gouvernements provinciaux et municipaux. Si les services d'hygiène recevaient cette aide des médecin ils pourraient étendre leurs activités à des régions éloignées et les médecins seraient non seulement en contact avec les malades mais aussi avec les enfants bien portants. L'auteur insiste sur le fait que les personnes immunisées devraient recevoir un certificat comme quoi elles ont reçu tel ou tel vaccin, ceci dans le but d'éviter les mélanges.

Il conclut en suggérant que tous les médecins doivent se faire un devoir de considérer la prévention des maladies contagieuses, en se servant de leur influence pour faire vacciner les enfants dans les familles qu'ils fréquentent.

YVES PRÉVOST

THE HEAD-DOWN POSITION IN HYPOTENSION.—The effect of the 18 degree head-down position on the cardiac output and blood-pressure of dogs and cats in states of arterial hypotension was studied. Arterial hypotension was produced in one series by bleeding and in another by high spinal anæsthesia. No significant improvement in cardiac output or blood-pressure was noted in hæmorrhagic hypotension. In the hypotension of high spinal anæsthesia, on the other hand, a significant increase in blood-pressure followed the adoption of the 18 degree head-down tilt. The coincident improvement in cardiac output was on the borderline of statistical significance. Variations in cardiac output and in blood-pressure were roughly parallel. Graham, A. J. P. and Douglas, D. M.: *Lancet*, **257**: 941, 1949.

THE MANAGEMENT OF COMMON FACIAL INJURIES*

H. M. Graham, M.D., C.M.

Medical Arts Clinic, Regina, Sask.

IN writing this short paper, I have no intention of invading the field of the plastic surgeon. It is my object to place the subject upon the level of the ear, nose and throat man who sees and does considerable repair that the plastic surgeon infrequently is called upon to do. I believe that the repair of an injury to the mandible should not be undertaken by one who has not the special training needed to perform this type of work. A review of the literature that has been written upon similar topics would make it appear that it is the prerogative of the plastic surgeon. I have no quarrel with this, but the number of different methods used, the variety of the splints and instruments suggested, merely confuse one and are quickly forgotten by the man who does the ordinary type of work.

The accident that has caused the facial injury will leave a number of cases in shock. It is elementary that this should be treated first. However, the sooner the injuries are repaired the better the result. As a consequence, the bones should be aligned and the skin sutured at the earliest opportunity. The preparation of the wound can be simply and thoroughly done by the application of a bountiful supply of green soap and water. The use of antiseptics is unnecessary and may be harmful. All particles that have been embedded should be removed either by flushing with sterile water or by forceps.

There is no part of the body where treatment of skin wounds is so important as upon the face, and yet one sees clips, large retention sutures, heavy forceps and a variety of other means used to obtain the closure of a simple wound. I feel that this maltreatment results from lack of time and surely not from lack of knowledge or of pride in work.

One must consider that the skin is on the outside and has only two feeding grounds, *i.e.*, from the deeper structures and from itself. What happens when a forceps or large retention suture is placed on or in the skin and given a fairly stiff pull to get an approximation? If it is a forceps there is an immediate effect of pressure necrosis which causes a loss of a number of cells and prevents primary healing occurring as easily as it should. The suture causes damage depending on its size. If it is pulled tightly, and is a fine suture, it cuts through the skin and underlying layers. This causes an incision that also has to be healed, with resulting scar-tissue being formed which in some cases is quite extensive. If, on the other hand, a large suture is used and pulled tightly to obtain approximation the tissue is damaged by the size and amount of pressure brought to bear. It is only logical, therefore, that a fine suture should be used and the tension should be the least possible. I have no intention in this paper to try and dictate what should be used, but from my own experience I find that horsehair or 4-0 plastic suture with fused needle appears to be the least irritating. I realize that this opens an argument as many no doubt use silk. I have found that silk is very unsatisfactory, as it has a tendency to fray and does not leave nearly as clean a suture wound as the others I have just mentioned.

The approximation of the skin and the fineness of the suture line does not depend to a great extent upon the skin suturing. There is one thing that is imperative. The cutaneous margins of the skin must approximate without any tension. In order to do this two procedures must be carried out. The deep structures must be closely approximated and the full thickness of the skin be generously under cut and 3-0 plain catgut passed through the deeper layers. There may be a considerable amount of tension in the deep structures and the under layers of the skin, but if they are well and truly placed together it is surprising how the face can be displaced and eventually regain its shape.

I mentioned earlier that skin forceps are not necessary and may be damaging. The use of skin hooks I believe is not only more desirable but simplifies the procedure. Closure of the skin defect by these methods usually places the skin suture line in a different alignment from the approximated deeper layers, an important protection against contraction of the healing wound in a deforming manner.

In a female the time of operation, if it can be selected, is important. Turchik writes, "The

* Read before the Eightieth Annual Meeting of the Canadian Medical Association, Section of Otolaryngology, Saskatoon, June 16, 1949.

more frequent incidence of bleeding, ecchymosis and postoperative swelling occurring in patients operated on just before or during the first few days of the menstrual period may be explained upon this basis''. He is speaking of the suggestion of greater capillary permeability or capillary weakness (*Arch. of Otolaryngol.*, **49**: 78, 1949).

In a paper on facial injuries the broken nose must obviously be considered. There have been a great number of articles in the past year or so, dealing with the importance of the septum in reconstruction. I feel personally, that a good number of these articles have been submitted because the author wished to see his name in print, or as Maliniar states, ''Some of these theories and methods of reconstruction are unwarranted as they have no basis either in clinical observation or in surgical anatomy'' (*Arch. of Otolaryngol.*, **48**: 120, 1948).

Nasal fractures can be divided into two classes; the result of (1) a side blow; (2) a direct blow. The case that has had the side blow is fortunate, but the principle of correcting these recently broken noses is very similar in both instances, in that in the usual case the septum is aligned with an Asch forceps, the bones are elevated with a blunt elevator, and finally, the external contour is manually re-established. Except for the fractures sustained by a direct blow, very few require packing or any method of fixation.

The proper alignment of the septum is a very necessary manœuvre, as it acts as a scantling upon which the nasal bones and cartilages hang until healed. The bones also help to hold themselves by the interlocking of the fractured edges. If they are so comminuted that intra-nasal packing is required to maintain the fragments in position, a well lubricated finger cot partially filled with ½" packing can be used. In the ordinary cases of which I speak, the multiplicity of types of nasal splints would argue against their value.

In consideration of the fracture of the maxilla a good deal of judgment must be used as to whether an ear, nose and throat specialist should attempt the restoration. In a great number of cases when the patient has been involved in a motor accident, the restoration of the face to its former contour is very frequently of secondary consideration. The numerous other fractures involving the skull, arms, legs, pelvis, etc., and the general condition of the patient must be carefully considered before one attempts to evaluate the damage to the facial structures. The full damage to the maxilla may be very hard to determine immediately after an accident, as it is often very difficult to obtain x-rays that are satisfactory, and the œdema of the face may obliterate a goodly number of landmarks. If it is felt that spicules of bone are penetrating the brain, or that there is a fracture of the skull, I feel that this should be the work of the neurosurgeon.

There are two fractures, however, that can be handled readily. These are (*a*) where the nose is broken and the anterior wall of the sinus is crushed in, and (*b*) the case of the blow that involves a fracture of the maxilla at the juncture of the zygomatic process. In a good number of cases where the nose is broken and the anterior wall of the sinuses crushed, the realignment of the nasal bones is sufficient. If, however, the bite of the patient is not correct, one would be well advised to ask the help of an orthodontist or plastic surgeon, as in spite of appearances and negative x-ray the fracture must be more extensive.

The second type of fracture involves the maxilla and zygomatic bones. It is really a dislocation of the zygomatic, as it only involves the maxilla at its articulation. The contour of the cheek is dependent on this bone because of its articulation, posteriorly with the zygomatic process of the temporal, by which junction the zygomatic arch is formed, and superiorly it unites with the frontal bone and the great wing of the sphenoid. It thus forms a part of the lateral and inferior wall of the orbit. Beneath the zygomatic arch is the coronoid process of the mandible, an anatomical fact worthy of notice. A depressed fracture of the zygoma may prevent normal movements of the mandible by mechanical interference.

A fracture of this bone is always the result of direct violence; it may be from below, from directly in front, or from above. The usual type of fracture involves the suture lines dislocating the bone upward, downward or backward. Any dislocation causes a deformity of the face and the orbit; thus, unless there is a considerable amount of œdema it is easily determined by x-ray and digital examination. Anæsthesia of the lower eyelid, upper lid and nose is common, due to the pressure on the infraorbital nerve. A careful examination of

the movements and level of the involved eyeball should also be made.

In the treatment of these fractures the important problem is to restore the normal alignment and approximation of the bone. Early treatment is essential as the healing is very rapid in this area, and after two weeks it may be almost impossible to reduce the fracture without resorting to operative separation of the fragments.

The method known as the Gillies method is probably the easiest one to follow, and as Bancroft and Murray state "is a classic in applied anatomy". In the hair-line anteriorly and superiorly to the ear a small incision about an inch long is made. It is dissected down to the temporal facia, through which an incision is made just large enough for the insertion of a flat instrument that resembles one of the tools used for tire changing. This is passed directly downward and forward under the zygomatic, which then can be levered into a normal position. To a great extent the leverage necessary is contingent upon the interval between the time of injury and time of treatment. After elevation no method of fixation is required.

Several days after reduction of the fracture, it is well again to determine the movements and levels of the eyeball on the involved side.

SUMMARY

1. The underlying structures should be carefully coapted by 000 catgut.

2. The superficial skin should be approximated without tension by fine horsehair or 0000 plastic suture with fused needle.

3. Forceps, clips, large sutures should not be used.

4. In nasal fractures the septum should be aligned and nasal bones manually re-established. Except in the most comminuted fractures, splints, packing, etc., are not required.

5. In zygomatic displacement it is essential that the displacement be corrected as soon as possible. In the ordinary case Gillies' method of replacement is the method of choice.

Medical Arts Clinic.

OBSERVATIONS ON THE MANAGEMENT OF PEPTIC ULCER*

D. A. Thompson, M.D., F.A.C.S., F.R.C.S.[C.]

Bathurst, N.B.

THIS paper is a review of the clinical management of 102 cases of peptic ulcer encountered over the period 1943 to 1948. The study was undertaken to ascertain the percentage of cases becoming surgical problems. The work was carried out in a small general hospital, and as these patients were followed from year to year, it was felt that considerable information regarding the progress and end results could be secured.

It has been suggested recently in the literature by Welch and Allen that the term peptic ulcer be eliminated; apparently to expedite the diagnosis of gastric carcinoma. The necessity for early diagnosis of the latter is evident, but in any consideration of the ulcer problem the duodenum and stomach should be considered as functionally integrated.

In this review every effort has been made to exclude doubtful cases and only those that have been proved by history, x-ray examination and subsequent course are included. In this connection it is interesting to note that the diagnostic difficulties arose chiefly as the result of the ability of the stomach to protest the ills of neighbouring organs and to respond to the stimuli of a disordered nervous system.

The material studied is of note in regard to the occupation of the patients. They are predominantly labourers of varied types—from the farms, the forests and the seas. There were 79 males and 23 females, ranging in age from 19 to 81 years. The greatest incidence of the disease occurred in the age group between 30 and 40. There were 71 duodenal ulcers, 30 gastric ulcers and 1 stomal ulcer.

DIAGNOSIS

The most important factor has been the information obtained from a careful history. It is essential to seek out the beginning of the complaints and to trace the story from that point. In the duodenal ulcer group, periodicity and location of pain in the epigastrium or to the right of the midline were remarkably constant. The history in gastric ulcer was not as definitive,

* Read before the Eightieth Annual Meeting of the Canadian Medical Association, Section of Surgery, Saskatoon, June 17, 1949.

and the pain was often referred to the thorax or left mid abdomen. Prompt dietary relief was more readily achieved in the duodenal group. As suggested by Alvarez, a strict Sippy diet as a therapeutic test proved to be of the utmost value. If the patient is not speedily relieved of symptoms the diagnosis of ulcer is probably incorrect. The fractional gastric test meal proved to be a considerable diagnostic aid. In the presence of achlorhydria in the young or middle aged group, the diagnosis of ulcer should not be made. The x-ray findings were used as confirmatory evidence and not as the primary diagnostic procedure.

One diagnostic pitfall was encountered and is mentioned in the hope that it may arouse increased interest in a common but mysterious condition. In two cases, not included in this study, the history, clinical, and radiological findings were in keeping with the diagnosis of duodenal ulcer. Because of intractable pain and failure of medical measures they were submitted to operation, but no evidence of duodenal or gastric ulcer could be demonstrated. In each instance there were numerous large succulent lymph nodes high in the root of the jejunal mesentery, a non-specific mesenteric adenitis. In each instance a longitudinal opening across the pylorus in the first portion of the duodenum was made for palpation of the duodenum. This was utilized in closure as a Heineke-Mikulicz pyloroplasty. It is believed that the symptoms were based on reflex pyloric spasm. The symptoms were subsequently completely relieved.

TABLE I.
CLASSIFICATION OF SURGICAL CASES AND TYPE OF OPERATION

	Surgical
Duodenal	20
Gastric	13
Gastro-jejunal	1
	Type of operation
Resection	25
Resection of stomach and involved jejunum	1
Simple closure perforation	5
Gastro-jejunostomy	3

In the group there were 34 who became surgical problems, *i.e.*, 33.3% of the total. The indications for surgery were: perforation, penetration, pyloric stenosis and hæmorrhage. Wherever feasible a thorough trial of rest, Sippy regimen and the usual medication was carried out. In retrospect it is felt that in certain instances prolonged medical therapy was unjustified and certainly contributed to difficulties encountered when surgical intervention became a necessity. In those submitted to resection subtotal retro-colic Hofmeister type of operation was used removing approximately 75% of the stomach. The work of Wangensteen in this connection seems of great importance in the prevention of recurrent ulceration, *i.e.*, jejunal ulcer; and the shortest possible afferent loop is desirable. A publication by Steinberg offers strong support to this viewpoint.

It does not seem reasonable to standardize all surgical treatment for ulcer on the basis of resection. Vital considerations are the age, condition of the patient, and the technical problem presented. Heuer has reported, in comparing the results of resection and gastrojejunostomy, that resection yields 3.5% more favourable results and he points out that the period of observation in resection is of much shorter duration.

One gastro-jejunostomy was carried out on a man of 81 years with a large penetrating posterior wall gastric ulcer and he has been relatively well for the past four years. Two other similar operations were carried out on small posterior wall duodenal ulcers with low acid values in young patients, with satisfactory results to date.

Further analysis shows that 17 cases of bleeding ulcer were encountered. Of these 7 were treated surgically. The only death in the series arose as the result of resection for bleeding ulcer in a luetic hypertensive. He had a history of neglected perforation and drainage of subphrenic abscess ten years previously. Death followed bile leakage from failure of healing in the duodenal stump. In the treatment of hæmorrhage no attempt was made to limit the amount of blood given but rather every effort was directed to the rapid replacement of blood loss by repeated transfusions. Depending upon the age of the patient and previous history of bleeding when the hæmoglobin had been restored to 60% operation was undertaken. The mortality for all cases of hæmorrhage was 5.8%.

In analysis of the end results it may be said that the immediate results of medical therapy are excellent but that recurrent symptoms are exceedingly high. If the disease progresses to the chronic state with intractable symptoms

then surgery is indicated. The economic disability in these patients is a serious consideration. In the cases treated surgically the results have been satisfactory. To date there has been no instance of anastomotic ulcer and they have been able to carry on with their work; chiefly that of hard labour. In one instance symptoms suggestive of "dumping stomach" were controlled by frequent small feedings. These patients rarely gained much weight. Often they remained lighter in weight than prior to operation. Anæmia has not proved troublesome. Adjustment to the effects of operation varies with the individual but it may be as long as three or four months before he is able to resume hard work. The immediate mortality in the surgical treatment was 2.9%.

One patient died within a two-year period as the result of carcinomatosis of the abdomen. The clinical impression at the time of operation was that of carcinomatous ulcer of the stomach but the pathologist reported benign ulcer. Therefore the incidence of carcinoma in the gastric ulcers submitted to operation may be regarded as 7.6%.

I have had no experience with vagotomy in the management of ulcer but feel that the operation lacks a sound physiological basis. The best results reported in the literature have combined vagotomy with pyloroplasty or gastro-jejunostomy and it is difficult to evaluate the true worth of vagotomy. Recently it has been suggested by Griswold that differentiation between the cephalic and humoral phase of gastric secretion as the propagating agent in ulcer genesis, could be applied in the selection of vagotomy or resection in the surgical management of duodenal ulcer. If such a differentiation be possible the results from vagotomy may be improved. It would seem that in the future, inhibition of gastric secretion may be achieved by some substance such as atabrine and that eventually gastric surgery may reach the same stage as the surgery of the sympathetic nervous system where chemotherapy is holding out a promising picture for the future.

SUMMARY

1. One hundred and two cases of peptic ulcer are discussed with reference to surgical indications. One-third of the group required surgical intervention on the basis of perforation, penetration or hæmorrhage.

2. The selection of operation is discussed, the mortality is 2.9%.

3. The end results are reviewed: no anastomotic ulcers are found.

4. The careful selection of surgical cases and the type of operation performed is of great importance in evaluating the end results of surgery for these patients.

5. There is little evidence to indicate that vagotomy will supplant resection, but rather that chemical control of gastric secretion may prove feasible in the future.

REFERENCES

1. WELCH, C. E. AND ALLAN, A. W.: *New England J. Med.*, **240**: 277, 1949.
2. ALVAREZ, W.: Nervousness, Indigestion and Pain, Hoeber, New York, p. 206, 1943.
3. WANGENSTEEN, O. H.: *Canad. M. A. J.*, **53**: 309, 1945.
4. STEINBERG, M. E.: *Surg., Gynec. & Obst.*, **84**: 1029, 1947.
5. HEUER: The Treatment of Peptic Ulcer, J. B. Lippincott, p. 48, 1944.
6. GRISWOLD, R. A.: *Surg., Gynec. & Obst.*, **88**: 585, 1949.
7. BABKIN, B. P. AND KARP, D.: *Canad. M. A. J.*, **56**: 137, 1947.

OCULAR FINDINGS IN CONGENITAL HEART DISEASE*

J. L. Kyle, M.D.

Toronto, Ont.

CONSIDERABLE interest has been stimulated in congenital heart disease in recent years, largely through the report of Blalock and Taussig[1] on the surgical treatment of malformations of the heart. Walsh[2] has drawn attention to the fact that many of these cases exhibit ocular symptomatology. This prompted an ophthalmological study of congenital heart cases admitted to the Toronto General Hospital and the Hospital for Sick Children during the past year. In this group there are included 17 cases of tetralogy of Fallot, 7 cases of patent ductus arteriosus, 3 Eisenmenger's syndrome, 2 interauricular septal defects, one interventricular septal defect, and one condition undiagnosed. Many of these cases eventually had so-called "blue baby" operations, and an opportunity was presented to study the fundus picture in these pre- and post-operatively.

Since the tetralogy of Fallot comprises the majority of these cases, the clinical manifestations of this syndrome will be described first. This congenital heart lesion consists of: (1) dextra-position of the aorta; (2)

* Read before the Section of Ophthalmology, Academy of Medicine, Toronto, March 7, 1949.

From the Department of Ophthalmology, University of Toronto, Toronto General Hospital, and Hospital for Sick Children.

patent interventricular septum; (3) stenosis of the pulmonary artery; (4) hypertrophy of the right ventricle. All varieties and variations of this condition may occur. These patients all exhibit cyanosis which is present at birth but may increase during the next year or two. Their exercise tolerance is markedly restricted and there is clubbing of the fingers and toes. A systolic cardiac murmur is present in the pulmonary area, but may be heard widely over the præcordium.

A compensatory or secondary polycythæmia occurs owing to the pulmonary stenosis, resulting in poor oxygenation of the blood. Polycythæmia is a condition characterized by a marked increase in the number of red blood cells. The primary form or polycythæmia rubra vera is a most familiar condition. The secondary form may also occur in chronic diseases of the lungs, diseases which produce dehydration, such as cholera or dysentery, and in individuals who reside at high altitudes. In addition to the increase in the number of red blood cells, the hæmoglobin is increased as well. The oxygen saturation of the arterial blood is markedly diminished.

The principal ocular manifestation in congenital heart disease is the fundus picture and it would appear to be directly proportional to the severity of the polycythæmia. This ophthalmoscopic picture consists of engorged and tortuous veins, of arteries which resemble normal veins in their appearance, and of a generalized purplish hue of the entire fundus. This purplish hue forms part of a general cyanosis. Often the engorged vessels dip deeply into the retina. When the engorgement becomes so marked as to change the colour of the fundus, the term, "cyanosis retinæ", may be applied. In 1841, v. Ammon[3] first briefly noted the relationship of cyanosis retinæ with congenital heart disease. Posey[4] in 1905 restricted the use of the term, cyanosis retinæ, and applied it solely in connection with congenital heart disease. However, Kronfeld[5] and Cohen,[6] drew attention to the fact that the fundus picture in congenital heart disease was due to the secondary polycythæmia. de Schweinitz and Woods[7] attempted to establish a quantitative relationship between the polycythæmia and the retinal cyanosis. They believed that a red blood count of 7,836,000 and a hæmoglobin of 115% were necessary to cause a definite state of cyanosis retinæ. However, a high content of reduced hæmoglobin in the blood will produce the fundus picture, even though the polycythæmia is not as severe as the above limits.

Kronfeld[5] believes the highest degrees of cyanosis retinæ occur in cases of congenital heart disease with pulmonary stenosis. He described a case that showed 2 or 3 dioptres of swelling of the discs in each eye. The entire eyeground was of a dark purplish colour and the whole vascular tree enormously widened, with the veins showing the dilatation more markedly than the arteries. The blood in the arteries was an intense dark red colour, the venous blood being almost black. The visual fields showed moderately enlarged blind spots. Death subsequently occurred and the autopsy report revealed congenital heart disease, stenosis of the pulmonary artery, defect in the interventricular septum, transposition of the large vessels, and chronic endocarditis of all the valves. The eyes were enucleated and subsequently examined pathologically. An enormous dilatation of the entire vascular tree in all its parts was present. There was no active proliferation of vessels, only preformed vessels undergoing this dilatation. The anterior segments were normal, except the iris which showed a slight increase of capillaries and small vessels. These vascular changes were most marked in the posterior segments. The choroid was almost twice as thick as normal with its thickest portion at the posterior pole. It had the appearance of an angioma. The entrance of the optic nerve showed a typical choked disc and the nerve head showed surprisingly many capillaries. The retina was the structure most markedly altered by the vascular dilatation. The large vessels in several places occupied its entire thickness and touched the pigment epithelium. The large vessels were very tortuous and made many short curves in the plane of the retina. Special stains showed the vessel walls to be normal.

In our series of cases, all grades of the above picture have been observed varying from the intense vascular dilatation described in Kronfeld's cases to those cases which show a normal vascular tree with only slight darkening of the venous blood and a normal fundus hue. Table I shows the incidence of cyanosis retinæ in congenital heart disease and its relationship to the degree of polycythæmia present. Fourteen cases of tetralogy of Fallot and 2 cases of Eisenmenger's syndrome exhibited various degrees of cyanosis retinæ. Four cases of tetralogy of Fallot showed a marked degree of venous engorgement. These 4 cases also showed blurring of the nasal disc margins, but no measurable papillœdema was evident. In the literature, in addition to the characteristic venous changes, other fundus lesions have been described including in individual instances,

hyperæmic discs, papillœdema, bilateral post-neuritic atrophy, retinal hæmorrhages, and perivasculitis surrounding the veins. These conditions were not observed in our series of cases. One patient, a girl, age 6, showed a marked pigmentation of the macular area in both eyes, and it was thought that this might be a juvenile macular degeneration. However, vision could be corrected to 6/6 in both eyes, and no family history of the condition could be elicited. Another patient, a boy, age 14, showed sheathing of the veins below the disc.

Patients with polycythæmia are prone to develop thrombosis due to the increased viscosity of the blood. In cases operated on for congenital heart disease, thrombosis is apt to occur at the site of the arterial anastomosis. For this reason, heparin and dicoumarol are given postoperatively. Cerebral thrombosis occasionally occurs, and this might well result in brain abscess and consequent papillœdema from at the time of discharge from the hospital. This startling change was, of course, observed only in those cases where the polycythæmia was marked.

Gregg[9] in 1941 drew attention to the incidence of congenital cataracts and congenital heart disease occurring in the offspring of mothers who had contracted German measles during the first three months of pregnancy following an epidemic of German measles in Australia. Swan and colleagues[10] reported a high incidence of congenital defects in the infants of mothers who had contracted an infectious disease during pregnancy. The abnormalities included cataract, deaf-mutism, congenital heart disease, microcephaly, and mental retardation. Reese[11] reported three cases of infants with congenital cataracts and congenital heart disease. Their mothers had all contracted German measles during the first month of pregnancy. Consequently, a careful slit-lamp examination was done on all of our cases for congenital lens

TABLE I.

INCIDENCE OF CYANOSIS RETINÆ IN CONGENITAL HEART DISEASE

Type of lesion	*No. cases*	*Hb. range*	*R.B.C. range*	*No. cases showing cyanosis retinæ*
Tetralogy of Fallot	17	110–163%	5.4–7.8	14
Patent ductus arteriosus	6	84–102%	4.0–5.2	0
Eisenmenger's syndrome	3	64–115%	3.1–6.5	2
Interauricular septal defect	2	103–116%	5.3–5.6	0
Patent interventricular septal defect with pulm. valve insufficiency	1	90%	4.6	0
Undiagnosed	1	130%	5.8	1

increased intracranial pressure. Thrombosis of the central retinal vein was not observed in our series of cases. Goldzeiher[8] in 1908 reported a case of spontaneous rupture of an eye with secondary hæmorrhagic glaucoma in a patient with congenital heart disease and cyanosis retinæ in the other eye.

The majority of cases in this series had congenital heart operations and the eye grounds were studied pre- and post-operatively. Preoperatively these cases exhibited the fundus picture of cyanosis retinæ which has already been attributed to the compensatory polycythæmia present in congenital heart disease. The arterial blood was dark red and the venous blood almost black while the generalized hue of the fundus was purplish. Postoperatively, a gradual improvement was noted in the colour of the blood in the vessels over the first few days. The normal hue of the fundus and the normal appearance of arterial and venous blood was present

opacities. In our series of cases, anterior axial embryonic opacities were noted in four cases and persistence of the anterior portion of the hyaloid artery occurred in two. One patient, a female, aged 21, had bilateral coronary cataracts and multiple blue dot opacities. Another infant had a unilateral total cataract associated with other gross ocular defects consisting of microcornea and microphthalmos, heterochromia iridis, and esotropia. In none of these cases of congenital cataracts and congenital heart disease could a history be obtained of the mother having German measles during the first three months of pregnancy.

Four cases exhibited Horner's syndrome postoperatively. This occurred on the side of the anastomosis between one of the large branches of the aorta and the pulmonary vessels. As a rule, the syndrome tended to be mild and subsided after a few weeks.

SUMMARY

Thirty cases of congenital heart disease from the Toronto General Hospital and the Hospital for Sick Children have been examined for ocular manifestations. A typical fundus picture termed cyanosis retinæ has been described. The most marked degree of retinal cyanosis was observed in cases of tetralogy of Fallot and Eisenmenger's syndrome and appeared to be directly related to the degree of polycythæmia. A history of the mother contracting German measles in the first three months of pregnancy and resulting in congenital cataracts and congenital heart disease in the offspring could not be obtained in this series of cases. Four cases exhibited Horner's syndrome postoperatively.

Acknowledgment is made to Dr. Gordon Murray and Dr. John Keith for permission to examine this series of cases.

REFERENCES

1. BLALOCK, A. AND TAUSSIG, H. B.: *J. A. M. A.*, **128**: 189, 1945.
2. WALSH, F. B.: Clinical Neuro-Ophthalmology, Williams and Wilkins Company, Baltimore, 1st ed., p. 1065, 1947.
3. v. AMMON: *Klin Darstilling*, **3**: 75, 1841: Cited by Duke-Elder, Sir W. S., Textbook of Ophthalmology, C. V. Mosby Company, St. Louis, vol. III, p. 2554, 1947.
4. POSEY, W. C.: *Am. Ophth. Soc.*, **10**: 634, 1905.
5. KRONFELD, P. C.: *Am. J. Ophth.*, **14**: 1108, 1931.
6. COHEN, M.: *Arch. Ophth.*, **17**: 811, 1937.
7. DE SCHWEINITZ, G. E. AND WOODS, A. C.: *Tr. Am. Ophth. Soc.*, **23**: 90, 1925.
8. GOLDZEIHER: *Cb. Pr. Aug.*, **28**: 257, 1904; Cited by Kronfeld, P. C.5
9. GREGG, N. M.: *Tr. Ophth. Soc. Australia*, **3**: 35, 1942.
10. SWAN, C. *et al.*: *M. J. Australia*, **2**: 201, 1943.
11. REESE, A. B.: *Am. J. Ophth.*, **27**: 483, 1944.

CHEST MOVEMENTS IN RESPIRATORY DISEASES*

Louis Cherniack, M.D., M.R.C.P.(Lond.), F.R.C.P.[C.]†

Winnipeg, Man.

SINCE the advent of radiography as an adjunct to the diagnosis of respiratory diseases, there has been a progressive tendency on the part of clinicians to lay the main emphasis on this form of examination, and relegate physical examination of the chest to a minor secondary rôle. This practice has been increased by the realization that pulmonary tuberculosis may be present and yet produce no physical signs, although the lesion may be easily detected in the x-ray film. It is unfortunate, however, that the trend includes non-tuberculous diseases and that the major reliance for the diagnosis of these diseases is being placed on the radiological interpretation. Physical findings in clinical examination of the chest, if correctly understood, will yield a fund of information rarely to be found in an x-ray film, no matter how expertly interpreted.

Although it is true that the rules for understanding physical chest signs have not altered for over a century and few new signs have been described in recent years, radiology has in no way altered their value. There is a definite percentage of error even in an x-ray film expertly taken. Radiology of the chest is still in the process of development and, as better techniques are developed in years to come, the present standards may well be considered inadequate and unsatisfactory. At present, to be absolutely certain that a chest is negative radiologically, it is really necessary to have not only the standard postero-anterior and lateral views, but also an antero-posterior exposure, a tomogram, and a bronchogram; all of which, would be obviously impractical as routine procedure.

Errors in diagnosis are inevitable if the x-ray film is used as a short-cut in the study of a patient. The final decision in the diagnosis of respiratory diseases must ultimately rest on the physical findings, correctly recognized and properly interpreted. It is the purpose of this paper to restate the important physical signs that occur in respiratory diseases and to attempt to evaluate their importance in reaching a clinical diagnosis.

In the clinical examination of the respiratory system, the methods of inspection, palpation, percussion and auscultation, are all directed towards the study of three qualities possessed by the lung, namely, its volume, density and extensibility. The changes that occur in the density of the lung in pulmonary disease have been most thoroughly studied by clinicians, as indicated by recognition of the impaired note to percussion and the presence of adventitious sounds. These signs are familiar to all, and need not be discussed in this paper.

However, it is proposed to discuss in detail extensibility and change in lung volume. The study of these qualities have primary importance in the physical examination of the chest, as these are the first to show any modification in

* Presented before the Brandon Medical Society, November 10, 1948.

† Division of Medicine, Winnipeg Clinic, Winnipeg, Manitoba.

pulmonary disease. The demonstration of diminished movement, which indicates alteration of extensibility, occurs long before any evidence of alteration in density has occurred. This is the first hint given to the clinician that an underlying pathological process has taken place; with this knowledge he can proceed by various other methods of examination to determine the cause.

EXTENSIBILITY

Extensibility is dependent on the enormously rich elastic structure possessed by the lung. Not only does elastic tissue extend from the trachea to the finest bronchial ramifications, but it also envelops the alveolar walls. The pulmonary vessels, both lymphatic and vascular, which are supported by connective tissue and run alongside the branches of the bronchial tree, all possess elastic qualities too, because they elongate on inspiration and shorten on expiration. Any pathological process, by distending the alveoli with inflammatory exudate or actually destroying the elastic tissue, will impair the elastic qualities or extensibility of the affected portion of the lung. Similarly, a foreign body in the pleural cavity such as fluid or air, will effectively limit the expansion of the underlying lung parenchyma. Deformity of the chest wall due to kyphoscoliosis, fractured ribs with associated spasm of the intercostal muscles, or arthritis of the costo-vertebral joints in spondylitis ankylopoietica, will also hinder the expansion of the underlying lung.

Normally, inspiratory extension of the lungs together with increase in lung volume, takes place in three dimensions, namely antero-posterior, transverse and longitudinal. This is due to the elevation of the ribs produced by the contraction of the scalenes and the intercostal muscles, and the descent of the diaphragm, which occurs when that organ contracts. It must be recalled, however, that due to the particular structure and conformation of the thoracic cage, the entire lung does not extend or increase in volume uniformly in all directions as if it were an elastic bag. Instead, different portions of the lung expand in varying degrees and in different directions.

In order to understand this, it is necessary to review a few salient features regarding the anatomical structure of the thoracic cage. Each rib can be regarded as a lever, with its fulcrum situated immediately lateral to the costo-vertebral articulation, a slight movement at the costo-vertebral end of the rib will produce a greatly magnified movement at the anterior portion of that rib. The anterior end of the rib lies in a lower plane than the posterior end. When the shaft is elevated, the anterior end is also thrust forward, thus increasing the antero-posterior diameter of the chest. The central portion of the shaft of the rib also lies in a plane lower than that which passes between the two ends of the ribs. As a result, when the rib is raised on inspiration, it is carried out in a lateral direction. This, together with the fact that each rib makes a greater segment of an arc than the one immediately above it, results in a transverse widening of the thoracic cage on inspiration.

The first rib plays a very important rôle in the initiation of the inspiratory act. To it are attached the scalene muscles which arise from the transverse processes of the cervical vertebræ; these contract first and produce a fixing of the first rib, as well as raising its anterior end together with the manubrium sterni to which it is attached. This results in a slight increase in the antero-posterior diameter of the upper outlet of the thorax and a consequent slight expansion of the underlying anterior portion of the apex of the lung.

The next five ribs, which are attached to the sternum, are connected with one another by the internal intercostal muscles whose fibres run in a downward and forward direction. As the first rib is fixed, contraction of these muscles results in an elevation of the other five ribs. These ribs, especially the upper four, are characterized by a slight curvature of their shafts, and horizontal articulating ends with the vertebræ. Consequently, there is very little lateral movement and the major expansion of that part of the chest will be in an antero-posterior direction, the sternum being raised upwards and forwards. The portion of the lung directly underlying these ribs consists only of the upper lobes, and these are the only parts of the lungs affected by this particular movement of the chest. As a result, when the upper lobes expand they do so in a forward direction, enlarging in an undulatory manner as each succeeding rib is raised following the one above.

The manœuvre for measuring and comparing the extent of movement of the upper lobes

takes into account this forward expansion. This is done by placing the palms of both hands symmetrically over the upper anterior chest wall with the fingers uppermost. In order to magnify the movement of the chest as much as possible, the hands are first placed over the trapezius muscles and then firmly pulled downwards till the palms lie in the intraclavicular areas with the fingers in the supraclavicular region (Fig. 1a). With the thumbs held at right-angles, the hands are pulled medially till the thumbs meet in the midline over the sternum. With the shoulder acting as a fulcrum, the thumbs move away from one another as the upper lobes expand on inspiration (Fig. 1b).

The extent of movement of the thumbs away from each other will normally be equidistant from the mid-line of the sternum. Only inequality or a lag in movement on one side implies underlying disease. The actual extent of movement is of little importance as this varies in the normal individual just as the percussion note does. The more flexible the rib-cartilages, the greater extent of movement will occur in the ribs on inspiration. This diminution in movement implies diminished extensibility of the lung, but whether the fault lies in the ribs, pleura, bronchi or lung parenchyma, will have to be determined by other methods of study. The important fact is that by eliciting diminished movement it is now known that an abnormality exists.

Underlying the fifth and sixth ribs are the middle lobe on the right side and the lingula on the left. Although anatomically a portion of the left upper lobe, the lingula possesses its own bronchus and really corresponds to the right middle lobe structurally. Both lobes are expanded by the inspiratory elevation of these ribs, which differ from the ones above in that there is greater bowing of the shafts and consequently, expansion of this portion of the chest will take place in both an antero-posterior and transverse diameter. The movement of the fifth and sixth ribs is tested by examining the transverse expansion. The hands are now held sideways with all the fingers widely stretched. These are placed in the rib interspaces high in the axilla, and both hands with the palms flat against the chest wall are pulled together till the out-stretched thumbs meet in the mid-line (Fig. 2a). With the shoulders acting as a fulcrum, the thumbs will move in a lateral direction as the chest expands. It is in order to encompass as much of the chest wall as possible with one's hands that the fingers are widely stretched and placed in the axilla (Fig. 2b).

The lower lobes are expanded by the elevation of the next four ribs, namely, the seventh to the tenth. As the shafts of these ribs are widely curved and all are characterized by sloping articulating ends with the vertebræ, in contrast with the horizontal ones possessed by the first six ribs, the resulting expansion of the chest on inspiration is entirely in the transverse diameter. This movement only affects the lower lobes, and these lobes are the only portions of the lungs which are also expanded in a vertical direction by the inspiratory con-

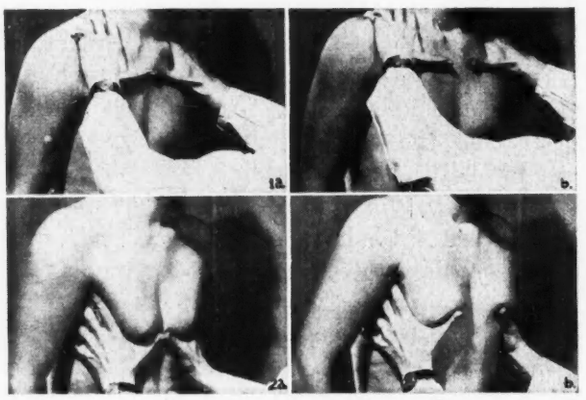


Fig. 1a.—Before deep inspiration both hands are placed on the upper part of the chest with the fingers over the trapezii and drawn down stretching the skin until the palms of the hands are in the subclavicular region, the two out-stretched thumbs meeting in the midline. **Fig. 1b.**—After patient deeply inspires both thumbs move away from the mid-sternal line, the distance being equal if both upper lobes are normal. **Fig. 2a.**—Before deep inspiration both hands, with the fingers and thumbs widely stretched, are placed high in the axilla and the chest compressed by bringing the two thumbs to meet in the midline over the sternum. **Fig. 2b.**—After deep inspiration both thumbs move away from the midline and if both lobes are normal the distance will be equal on both sides.

traction of the diaphragm. The downward movement can easily be assessed by percussing the diaphragmatic levels after deep inspiration; but it is the lateral movement which is more important, and any diminution here can easily be demonstrated by the same manœuvre which was described above for measuring movement over the middle lobe and lingula. Here much of the lower posterior chest wall is gripped in both hands with all the fingers widely out-stretched and the thumbs held at right angles to the palms (Figs. 3a and 3b). Even

though the final extent of movement may be equal on both sides, a lag in this movement on the affected side can easily be demonstrated.

As mentioned before, in addition to expansion in an antero-posterior and transverse diameter, which is a function of the ribs, scalenes and intercostal muscles, the lungs also expand in a vertical direction by the downward excursion of the diaphragm. This diaphragmatic action is opposite and antagonistic to the intercostal muscles, as these, by causing movement of the ribs in an upward direction, will tend to shorten the longitudinal diameter of the chest. The diaphragm has another action which is also antagonistic to the intercostals, in that by contracting, a pull is made on the costal margins to which it is attached and this tends to narrow the chest cage in a transverse diameter. Actually, the direction in which the costal margins will move will depend on the result of the conflict between these two groups

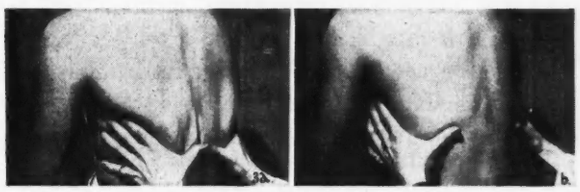


Fig. 3a.—Before inspiration both hands, with the fingers and thumbs widely stretched, are placed high up in the axilla and the chest is compressed by bringing the two thumbs to meet in the midline over the spinous processes. **Fig. 3b.**—After the patient takes a deep breath both thumbs move away from the midline, the distance being equal if both lower lobes are normal.

of muscles; normally the costal margin moves outwards because the balance of power is in favour of the intercostal muscles. The reason for this lies in the shape of the diaphragm. The force of the pull of a muscle is in a straight line between its two attachments, which in the case of the diaphragm are the costal margin and the central tendon. But as the diaphragm is a dome-shaped structure, the pull on the costal margin is considerably less than it would be if it were a flat sheet of muscle. This medial pull of the diaphragm on the costal margins gains full play in paralysis of the intercostal muscles, which may occur in an injury to the cervical cord, with a resultant narrowing of the costal angle.

This pull, or activation, of the diaphragm on the costal margin bears no relationship to the excursion or inspiratory descent of that organ. Activation depends on the degree of curvature of the diaphragmatic dome, and if this curve is altered, a change will take place in the relative strengths between the intercostals and the diaphragm, and with that, a change occurs in the lateral movement of the costal margins. It must be emphasized that this alteration in costal margin movement is not diagnostic of disease above or below the diaphragm. It only gives evidence of an alteration in the conformation of the vault of the diaphragm, which can be altered by diseases in the neighbourhood of this organ. In a pleural effusion, the vault of the diaphragm is flattened by the weight of the fluid and, as a result, the costal margin moves medially. In enlargement of the liver or a subphrenic abscess the dome of the diaphragm is elevated, thus decreasing its activating pull, with the result that the costal margin moves further outwards. In chronic adhesive pleurisy, however, not only is the dome raised but adhesions between the diaphragm and the chest wall give new points of insertion for the diaphragm, with the result that the activating power of the diaphragm is increased and the costal margin moves inwards. In other words, if the costal margin moves medially, it signifies that the diaphragm has gained mastery over the intercostals either by flattening of the diaphragm or by the development of adhesions between it and the chest wall or by paralysis of the intercostals. The direction and degree of movement of the two costal margins can easily be demonstrated by placing the thumbs along the costal margins and allowing the hands to move with them during a deep inspiration. This must be done with the patient lying on his back to avoid the counteractive effect of the abdominal muscles.

To make certain that the diminished movement which has been elicited in a part of the chest, is caused by a disease process in either the underlying pleural space or lung, it is necessary to exclude any factor that may be related to the thoracic cage itself. A normal chest is a symmetrical chest, and in this the thoracic vertebræ play a most important part. An obvious example of how the thoracic spine can affect the symmetry of the chest is the gross deformity which occurs in kyphoscoliosis. But minor deformities of the thoracic spine may be easily overlooked unless especially searched for, and these produce diminution in chest movement which may in error be attributed to a suspected pulmonary disease.

A type of deformity of the thoracic vertebræ that occurs very frequently in apparently healthy individuals is scoliosis with convexity to the right. For some reason, which is not completely understood, scoliosis to the left is comparatively rare. The cause of scoliosis itself is obscure, but it is undoubtedly related to posture habits, such as shifting the body weight to one leg and standing in a laterally bent or twisted position. This results in an asymmetrical tension of the dorsal muscles with the final development of a permanent deformity. Because of the abnormal tension of the dorsal muscles pulling on the transverse and spinous processes of the vertebræ, not only does a lateral curvature of the spine take place, but also there is a rotation of the vertebral bodies in an anti-clockwise manner toward the direction of the lateral curvature. The extent of this rotation is restrained by the tension in the intervertebral discs, which undergoes torsion as a result of this movement. Because of this rotation, the transverse spines and their attached ribs diverge on the convex side and converge on the concave side, making the right chest become more prominent; the left chest not only becomes retracted and moves less fully than the right side, but the sternum is also deviated to the left. The degree of asymmetry will naturally vary with the degree of the deformity of the thoracic spine, and the retraction of the chest wall may become so great that no movement occurs at all and actual compression of the underlying lung takes place. Therefore, by examining the thoracic spine during the initial part of the chest examination, one is forewarned about any possible abnormalities that may be discovered later, especially with regards to movement.

DENSITY AND LUNG VOLUME

When diminished excursion of part of the chest cage is discovered, and abnormalities of the thoracic spine have been excluded, then one knows that there is diminished extensibility of the underlying lung. But we still have no indication as to the actual disease process which has produced this change, or whether the pathological changes are situated in the pleural cavity, tracheo-bronchial tree or lung parenchyma. To obtain this information one has to make a study of any changes in density which have taken place, by the use of percussion and auscultatory methods. Here again, the information we obtain is limited. By a study of the alteration in density, we can infer the pathological process which has taken place, causing changes found in common with many respiratory diseases. It is only by correlating all the physical findings with the history that a clinical diagnosis of the actual disease can be correctly made.

Alteration in density does not occur, however, in diseases confined to a portion of the tracheo-bronchial tree, unless there is actual occlusion of that bronchus with secondary effects on the draining pulmonary segment. Here, the fundamental factor in the production of physical signs is the narrowing which occurs in the lumen of the affected portion of the bronchial tree. Whatever lesion produces this narrowing, whether inspissated bronchial secretion or a foreign body, the signs will be the same, namely, diminished excursion of the ribs over that portion of the lung drained by the affected bronchus, together with a wheeze which is localized on the chest wall over the site of narrowing of the bronchial lumen, and is audible when the stethoscope is placed over the open mouth as the patient breathes. This wheeze or "rhonchus" is produced by eddies in the current of air as it passed over the narrowed portion of the bronchus. As a physiological narrowing of the bronchial tree occurs in the expiratory phase of respiration, in contrast to the widening of the lumen which occurs on inspiration, minor degrees of narrowing will produce a wheeze which is only demonstrable during expiration. As this type of obstruction, which is similar to a by-pass valve, is not great enough to prevent the free entry and exit of air into the corresponding pulmonary segment of that bronchus, that portion of the lung will show no abnormality aside from a lag in inspiratory expansion. Then, as the tracheo-bronchial tree behaves as a conducting tube, the wheeze becomes easily audible if the bell of the stethoscope is held a few inches away from the patient's open mouth. This is often the first sign that develops in early bronchogenic carcinoma and should be diligently searched for in all patients with respiratory symptoms, especially if these have persisted for more than four weeks or the patient is over forty years of age. If this wheeze is detected over the open mouth, its actual site on the chest wall should be care-

fully elicited. A great deal of importance should be attached to the associated finding of diminished movement of a portion of the chest; when this is found the clinician should listen carefully to that region with the patient lying in different positions.

As the obstructive lesion progresses and projects more and more into the lumen of the bronchus, changes occur which are related to the physiological widening and narrowing of the lumen during respiration. On expiration, the bronchial wall comes into contact with the projecting lesion, resulting in complete closure of the bronchus. On inspiration, the lumen again becomes open, allowing the free entry of air into the pulmonary segment. Because of the complete closure of the bronchus which occurs only in the expiratory phase, changes in the density of the affected lobe occur. There is now an accumulation of air in the affected pulmonary segment, with the production of an "obstructive emphysema" localized to that segment. This type of obstruction is similar to a check-valve, which permits a flow in one direction only. The direction in which a flow is permitted in a check-valve can be altered by changing the valve; so in a bronchus, the obstruction may be such that the free exit of air is permitted during expiration, but there is complete blockage during inspiration. As a result, more and more air is squeezed out of the affected segment with the final production of an "obstructive atelectasis". The wheeze that will be audible in the check-valve type of obstruction will obviously only occur in the inspiratory phase of respiration.

In the final stage of bronchial obstruction, the bronchus is completely blocked, and no air is allowed to enter or leave the affected lung. This stop-valve type of obstruction results in the gradual absorption of the residual air confined in the affected pulmonary segment, with the production of atelectasis. No wheeze is now demonstrable and clinical diagnosis can be reached only by ascertaining the resulting increase in density associated with the decrease in lung volume.

SUMMARY

This paper has been an attempt to show the relative importance of physical examination of the lungs in relation to a radiological interpretation of a chest film, in the diagnosis of respiratory diseases. The three attributes possessed by the lung and studied in the clinical examination, are extensibility, density and lung volume. Of these, alteration in extensibility is considered to be the most important as this is always the first abnormal physical sign which occurs in pulmonary disease. By its effect on the overlying ribs, the clinician is able to infer that some disease process is taking place, and therefore localize the portion of the lung involved. By the study of the associated changes in the density and volume in the affected portion of the lung, he can reach a clinical diagnosis of the underlying pathological process. The only exception occurs in tracheobronchial disease where no alteration occurs in the density or volume of the lung until the occlusive process becomes so great that the free entry or exit of air is impeded.

BIBLIOGRAPHY

1. FUNK, E. H.: *Med. Clin. N. Am.*, 4: 1045, 1921.
2. Gray's Anatomy, 29th ed., Longmans, Green & Co., Toronto, 463, 1946.
3. HOOVER, C. F.: *Arch. Int. Med.*, 20: 701, 1917.
4. JACKSON, C.: *J. Am. M. Ass.*, 95: 640, 1930.
5. WEINMANN, J. P. AND SICHER, H.: Bone and Bones, C. V. Mosby Co., St. Louis, 160, 1947.

STUDIES IN PINWORM INFECTIONS

IV. Tests with p-benzylphenyl carbamate in the treatment of pinworm infections.*

M. J. Miller† and L. P. E. Choquette‡

Macdonald College, Montreal, Que.

PREVIOUS reports[1, 2, 3] in this series stressed the prevalence of enterobiasis in Canada and indicated the efficiency of gentian violet and phenothiazine in the treatment of this infection. Phenothiazine was shown to be the most efficient anthelmintic for the removal of pinworms from the body, but because of its potential toxicity, had to be used with caution. Gentian violet, while not as efficient as phenothiazine in the treatment of pinworm infections, was recommended for its relative efficiency in clearing up infection (60 to 90%), and the fact that it shows no serious untoward effects. On the other hand, gentian violet is not altogether satisfactory because of the frequent mild but unpleasant side effects of nausea and vomiting, and because of

* Contribution from the Institute of Parasitology, Macdonald College, McGill University, with financial assistance from the National Research Council of Canada.

† Associate Professor of Parasitology and Research Assistant.

‡ Lecturer and Research Assistant.

the difficulty experienced, particularly by children, in swallowing the tablets. In addition, this drug cannot be depended upon to cure every case. As gentian violet and phenothiazine are considered to be the best available drugs, it is apparent that the ideal drug for the treatment of pinworm infection has not yet been found. Recently, p-benzylphenyl carbamate* has been recommended for the treatment of pinworms. Experiments carried out to test the efficiency of this drug are reported below.

Methods.—A total of 37 children and 3 adults, all proved positive for pinworm infection by the cellophane-tape swab technique, was treated with p-benzylphenyl carbamate. They fall into two groups because of a difference in treatment methods. *Group A* includes two families, one in which the father D.D., the mother J.D., and two children, a boy I.D., age 5½ years, and a girl W.D., age 2 years, were all positive, and the second family in which the father A.M., and one child, a girl M.M., age 8½ years, were positive. In this group, in addition to the drug treatment, scrupulous personal and household hygiene was practised including changing and washing all bed and personal linen every day. The dosage schedule for Group A is shown in Table I.

Group B includes 34 children, ages 7 to 11 inclusive, all of whom were inmates of an orphanage in which over 90% of the children were infected with pinworms. These children, in addition to showing a high incidence of infection, also showed a high intensity of infection as judged by the ease with which eggs could be found on the perineum on different occasions. Drug treatment in this group was not accompanied by any special hygienic measures. Group B was divided into two groups; one of 18, in which each child received 1.5 gm. of drug per day for seven days, repeated after a seven-day treatment-free interval (total 21 gm.) and a second group of 16, in which each child received 2.0 gm. per day for seven days, repeated after a seven-day treatment-free interval (total 28 gm.). Twelve children of group B, who were among those still positive following the first course of treatment, were given a second course of treatment: of these six received 4.5 gm. of drug each per day for ten days (total 45 gm.) and each of the other six received 3 gm. per day for ten days (total 30 gm.).

TABLE I.

RESULTS OF TREATMENT WITH P-BENZYLPHENYL CARBAMATE PLUS STRICT HYGIENE OF PINWORM INFECTIONS IN GROUP A

Name	*Age*	*Dosage schedule*	*Post-treatment swab examination*
D.D.	Adult	3 grams per day for 7 days, repeated after a 7-day treatment-free interval.	Negative
J.D.	Adult	3 grams per day for 7 days, repeated after a 7-day treatment-free interval.	Positive
J.D.	Adult	Second course of treatment, 3 grams per day for 7 days, repeated after a 7-day treatment-free interval.	Positive
A.M.	Adult	3 grams per day for 7 days repeated after a 7-day treatment-free interval.	Negative
I.D.	5½ years	1.5 grams per day for 7 days, repeated after a 7-day treatment-free interval.	Positive
I.D.	5½ years	Second course of treatment, 1.5 grams per day for 7 days, repeated after a 7-day treatment-free interval.	Positive
W.D.	2 years	1 gram per day for 7 days, repeated after a 7-day treatment-free interval.	Negative
M.M.	8½ years	1.5 grams per day for 7 days, repeated after a 7-day treatment-free interval.	Positive
M.M.	8½ years	Second course of treatment, 1.5 grams per day for 7 days, repeated after a 7-day treatment-free interval.	Positive
M.M.	8½ years	Third course of treatment, 1.5 grams per day for 7 days, repeated after a 7-day treatment-free interval.	Positive

The drug was administered in tablets each containing 0.5 gm.

Post-treatment examinations were started from five to seven days after completion of treatment. A total of six post-treatment swabs was made on each child using the cellophane-tape swab technique. The danger of reinfections confusing the results can be disregarded here because the life cycle of *E. vermicularis* requires a period of about one month.

Results.—Results of Group A are presented in Table I. It can be seen that, when treatment with p-benzylphenyl carbamate was accompanied by hygienic measures, two of the three adults were cleared of the infection. The

* Sold under the trade names of Oxylan and Diphenan.

one adult (J.D.) who remained positive, as well as one child (I.D.), were given a second complete course of treatment without success. The second child (M.M.) who remained positive following the first course of treatment, was given two additional courses of treatment, or a total of three complete courses without eliminating the infection.

Of the 18 children in Group B who received 1.5 gm. of drug per day for seven days repeated after a treatment-free interval of seven days, three were cured of the infection while 15 remained positive. However, all 16 children in the same group who received the somewhat higher dosage, that is, a total of 28 gm. during the course of treatment, were positive at the end of treatment. The 12 children, six of whom had received a total of 30 gm. each and the other six a total of 45 gm. each during a ten-day period, were all found positive at the end of treatment. The authors have no explanation for the fact that the three children cleared of the infection received the smallest amount of drug. Special comment must be made on the appearance of the pinworm eggs seen on the post-treatment swabs in the group of 12 children receiving the relatively high dosage. Although in no case was the infection completely eradicated, a high percentage of the eggs seen on post-treatment swabs was non-viable and obviously degenerated. While it is usual to see an occasional degenerated egg on swabs from patients who have not received treatment, the number of degenerated eggs seen on the post-treatment swabs of the children in this group was abnormally high. In many cases the majority of the eggs seen on the first two post-treatment swabs was degenerated; as swab examinations continued the percentage of degenerated eggs gradually decreased.

Untoward effects.—P-benzylphenyl carbamate was found to be well tolerated by all persons receiving the drug. The tablets were swallowed easily by even the smallest children used in this study. The only untoward symptom was seen during the first course of treatment in Group A when all patients receiving the drug noticed an increased frequency of bowel movements which started about four days after the commencement of treatment and became more noticeable towards the end of the treatment period when four to five small semi-formed stools were passed daily. The bowel habits returned to normal after the cessation of the treatment. In three patients of this group who received a second course of treatment these symptoms did not recur.

TABLE II.

RESULTS OF TREATMENT WITH P-BENZYLPHENYL CARBAMATE OF PINWORM INFECTION IN GROUP B.

Number treated	*Dosage*	*Results of post-treatment swab examinations*	
		Positive	*Negative*
18	1.5 grams per day, repeated after a 7-day treatment-free interval	15	3
16	2.0 grams per day, repeated after a 7-day treatment-free interval	16	0
6	3.0 grams per day for 10 days	6	0
6	4.5 grams per day for 10 days	6	0

DISCUSSION AND CONCLUSIONS

The results of the present study, while limited in scope, indicate that p-benzylphenyl carbamate is not the ideal anthelmintic for the treatment of *Enterobius* infection. The percentage of complete cures that can be expected is not large even if treatment includes strict hygiene. On the other hand, there seems little doubt that this drug has enterobicidal properties as judged by the cases cured and, particularly, by the presence of large numbers of degenerate pinworm ova on swabs following administration of the drug. Unfortunately in pinworm infection, because of the overwhelming probability of auto-infection, a partial reduction in worm burden serves little purpose because the infection builds up again with great rapidity.

The non-toxic nature of p-benzylphenyl carbamate and the fact that it has enterobicidal properties suggest that while this drug cannot be recommended for the treatment of pinworms, further treatment studies should be made with it particularly using increased dosages and in combination with other enterobicidal drugs.

The authors wish to acknowledge their gratitude to British Drug Houses (Canada) Limited, for their courtesy in supplying the drug used in this study.

REFERENCES

1. MILLER, M. J. AND CHOQUETTE, L.: *Canad. M. A. J.*, 43: 453, 1940.
2. MILLER, M. J., CHOQUETTE, L., AUDET, W., KELSO, R. F. AND GUENETTE, J. A.: *Canad. M. A. J.*, 43: 455, 1940.
3. MILLER, M. J. AND ALLEN, D.: *Canad. M. A. J.*, 46: 111, 1942.

RÉSUMÉ

Les auteurs ont fait une étude sur l'action de ''p-phénylbenzyl carbamate'' dans les infections causées par les oxyures, chez 37 adultes et enfants. Les résultats ont été plus ou moins satisfaisants et le pourcentage de guérison a été faible malgré les soins hygiéniques les plus stricts. Ce médicament réduit le nombre des oxyures; cependant une diminution seule ne suffit pas car l'infection revient rapidement. ''P-phénylbenzl carbamate'' donnerait peut être des résultas en étant employé conjointement à d'autres médicaments ou à des doses plus élevées.

YVES PRÉVOST

CLINICAL-PATHOLOGICAL CONFERENCE

VANCOUVER GENERAL HOSPITAL,
APRIL 13, 1949

Francis S. Brien, M.D.

London, Ont.

CASE HISTORY

The patient was a white male, 40 years old. Three days after arrival in Vancouver from his home in England he sought medical advice regarding trouble in his lower extremities and was admitted to hospital.

Some six to eight weeks previously, he first became aware of soreness in his calves and legs, following the increased walking necessitated by the sale of his car. Within a week or two, he noticed the development of severe pain in both feet. The pain which became progressively worse was of a severe burning nature and frequently was accompanied by a sensation of pins and needles, until latterly he had been unable to sleep adequately. In addition, he had suffered severe leg cramps and reported that his feet felt ''like lead'', making it difficult to walk properly. During the past four weeks, and becoming increasingly worse he had noticed weakness on dorsi-flexion of his right foot. He had felt feverish and had bouts of sweating but no rigors, for about 10 days. He gave a history of intermittent paræsthesia of ulnar distribution bilaterally for six weeks.

In the past he had suffered from tonsillitis and influenza. Two years previous to admission he contracted syphilis for which he was treated with penicillin for 1 week followed by 1½ years of arsenic (52 injections) and bismuth. He had four negative blood Wassermanns, the last being about 7 months ago. He abstained from alcohol.

Functional enquiry elicited no additional information.

Examination on admission revealed a thin, small, tense, flushed man with a temperature of 103° and pulse of 100. The eyes were normal. A curd-like adherent exudate was present over the gingival, buccal and pharyngeal mucosa. It scraped off with difficulty, leaving no significant ulceration. The tongue was coated. Axillary, inguinal and epitrochlear glands were slightly enlarged and firm in consistency. No significant abnormalities were detectable in the chest or heart. Blood pressure was 160/100. The peripheral pulses were full and bounding. The liver was slightly enlarged but not tender. Otherwise, abdominal and rectal examinations were negative. No definite cranial nerve involvement could be detected. Biceps, triceps, knee jerks were normally elicited, as were the abdominal reflexes. The right ankle jerk was weakly present, the left absent. No response was obtained on plantar stimulation. Vibration sense was impaired at the malleoli. Hot and cold sensations were not appreciated from the ankles down. There was marked hypalgesia to pin prick over the lateral aspect of both calves and plantar surfaces of the feet, less marked over the deep peroneal distribution between the 1st and 2nd toes on the dorsum of the feet. A delayed intense burning pain on the soles of the feet followed application of the pin. Position sense in the toes was absent. Dorsi-flexion of the feet was very feebly carried out, but power in the legs was unimpaired. Slight weakness of the arms was also noted.

Hæmoglobin was 90% and white blood count 13,000 with normal differential count. Kahn was negative. Urinalysis was negative on admission, save for occasional white cells. Subsequent examinations showed albumin on several occasions, varying from a trace to 3 plus. The cerebro-spinal fluid was perfectly normal. Multiple bacteriological examinations of the blood, urine, fæces, spinal fluid and pharyngeal exudate were negative. An electrocardiogram shortly after admission was within normal limits. X-rays of chest, abdomen, teeth, sinuses spine and upper gastro-intestinal tract were non-contributory. Liver biopsy showed fatty metamorphosis only. The sternal marrow showed a picture suggestive of an infectious condition and was negative on culture.

Galvanic and Faradic stimulation to both lower extremities on the 21st hospital day established a peripheral nerve paralysis of all the muscles of the right lower limb below the knee and of the flexors and the toes and foot on the left.

The patient was put on a high caloric diet supplemented with vitamins. He was given penicillin during the first week, sulfa for the next three weeks and streptomycin thereafter.

His temperature, which was 103° on admission, thereafter showed a daily swing from normal to 102 or 103°, rarely below a maximum of 101°. Pulse was 100 to 120. His white blood count varied between 10,000 and 14,000 with predominance of polymorphonuclears with some toxic granulation present. The sedimentation rate varied between 50 and 90 mm./hr. The hæmoglobin varied between 90 and 75%. Total serum protein 6.5 gm. %, albumin 4.2 gm., globulin 2.3 gm., prothrombin index 100% of normal.

His weight decreased steadily from 108 lb. two weeks after admission to 80 lb. six weeks after admission. The pain in his legs persisted and the hepatomegaly, mild lymphadenopathy and paræsthesia showed little change. The mucosa of the mouth and pharynx improved considerably. About seven weeks after admission he developed evidence of a left sided hemiplegia coming on over the period of one hour. A lumbar puncture showed 3,000 red blood cells per c.mm. Blood pressure 180/120. From this time he rapidly deteriorated and died three days later, approximately 7½ weeks after admission.

DISCUSSION

(By Dr. F. S. Brien, Professor of Medicine, University of Western Ontario and visiting Physician-in-Chief, Vancouver General Hospital.)

To sum up, this patient developed peripheral neuritis, more marked in the lower extremities, some two months prior to his arrival in Vancouver. When first examined he was suffering from an acute stomatitis and pharyngitis, and was running a septic type of fever. Persistent axillary, inguinal and epitrochlear lymphadenopathy was noted. His blood pressure which was 160/100 on admission rose to 180/120 before his death, some seven weeks later. Vigorous therapy with sulfonamide, penicillin, and

streptomycin failed to influence his steady downhill septic course. His weight decreased from 106 to 80 lb. in about a month. Anæmia developed. It is altogether probable that his hæmoglobin was less than 75% when he died. His white blood count and sedimentation rate were consistently elevated. Differential count showed a preponderance of polymorphonuclear leucocytes. Urinalysis revealed variable albuminuria and a few white and red blood cells upon occasion. The development of hemiplegia, as a terminal event, over a period of an hour, with the finding of blood in the spinal fluid is of considerable interest. Most cerebral hæmorrhages are much more dramatic than this.

Coming from England, with peripheral neuritis and stomatitis and pharyngitis at once raises the possibility of diphtheria. Here the neuritic symptoms apparently antedated those in the buccal cavity. No bacteriological evidence to support a diagnosis of diphtheria was forthcoming. There was no definite cranial nerve involvement, such as usually precedes the development of peripheral neuritis, and the further course of the disease was quite unlike that of diphtheria with nervous involvement. It is distinctly rare for nerve trunk or muscle tenderness to be found in such cases.

The onset of his neurological symptoms was about four months after the conclusion of a year and a half of arsenical and bismuth therapy for early syphilis. The exact arsenical used is not specified, but presumably it was mapharsen or neoarsphenamine. The incidence of arsenical neuritis after intravenous therapy for syphilis must be exceedingly low. I do not know of a single case following the use of 5 day, or 20 day massive arsenic therapy, in the Canadian Army. Polyneuritis is much more likely to follow the ingestion of arsenic in the inorganic form.

Infectious polyneuritis can present with a variety of neurological pictures, which may fluctuate in chronic cases without apparent reason. Sensory disturbances of a stocking-glove type occur in many instances. Fever is usually absent or low-grade in patients without pulmonary complications. Commonly the spinal fluid protein is elevated, in the absence of an increase in cells — the so-called "albuminocytologic dissociation". We must look elsewhere for an explanation of this man's neurological problem.

He showed fever of a septic type, accompanied by an accelerated pulse, general weakness and wasting, in addition to marked wasting in the region of his paralysis, a developing anæmia and a persistent polymorphonuclear leucocytosis. Stomatitis and pharyngitis were observed on admission. He complained bitterly of abdominal pain at times, and suffered from diarrhœa on occasion. A persistent lymphadenopathy was present. Hypertension, of quite considerable proportions, developed while this man was in hospital. Renal involvement is indicated by the presence of albumin and blood cells in his urine. Obviously diffuse widespread pathological changes must be present in this case. Periarteritis nodosa should be considered in any case where there is an unusual combination of apparently unrelated clinical findings. In the terminal episode, a slowly developing hemiplegia, with blood in the spinal fluid, there is further confirmation of this diagnosis. Surely, the likely explanation is that a small aneurysm, due to involvement of a cerebral vessel by periarteritis nodosa, perforated, and the relatively slow escape of blood into the brain substance, and later into the subarachnoid space, resulted in the terminal clinical picture.

Periarteritis nodosa commonly presents in one of three ways: (1) As an acute infection or toxæmia—with fever leucocytosis, prostration, combined with signs of local involvement of one or more organs. (2) More often as a subacute illness with remissions and relapses, characterized by low and irregular fever, tachycardia out of proportion to the fever, leucocytosis, anæmia, progressive weakness and weight loss, combined with one or more local signs. Over 80% of cases show renal involvement, and neurological changes are present in a fairly high proportion, as are signs of cardiac involvement. This is the type of case most easily recognized. (3) In a small proportion of cases the main picture is that of a severe or malignant hypertension.

GENERAL DISCUSSION

Dr. H. A. DesBrisay: The Resident and attending staff were of the opinion for some weeks prior to death that periarteritis nodosa best fitted the picture.

Dr. A. W. Bagnall: I saw this case with Dr. Jones in the early stages and we were anxious to exclude periarteritis nodosa. His polyneuritis

was not glove-and-stocking type. I am interested in hearing of the changes that were found in the nerve trunks at post-mortem.

Dr. D. E. H. Cleveland: The question of possible arsenical poisoning has been raised. I would like to ask whether the trivalent or pentavalent form is more important in producing a neuritis. I have observed that skin pigmentation and keratoses occur chiefly after trivalent arsenicals.

Dr. F. S. Brien: Neuritis follows the ingestion of inorganic forms of arsenic most often. The only serious neurological complication of massive arsenotherapy for syphilis that I have encountered has been arsenical encephalopathy.

Dr. Munroe: Recently there was reported at the North Pacific Society of Internal Medicine a highly suspicious case of periarteritis nodosa which was confirmed by visualization of the lesion in the rectum.

Dr. W. W. Simpson: Eosinophilia is rare in lupus erythematosus and common in periarteritis nodosa.

Dr. F. S. Brien: The last time I carefully reviewed the literature some 350 cases of periarteritis nodosa were collected. Of these about 50 had been diagnosed before death, quite a few as the result of biopsy. Muscle biopsy yields a positive finding in under 25% of cases. Thorn of Boston feels that testicular biopsy, with a punch, is a valuable diagnostic procedure.

About one-third of the patients in whom a differential blood count is recorded have had an eosinophilia. This has ranged to as high as 79%, in Dr. Strong's case. At the moment I have a patient on my service in Victoria Hospital, with asthma, fleeting infiltration of the lungs by x-ray, and a peripheral neuritis affecting the lower extremities, who has a white blood count of about 25,000 with as high as 64% eosinophiles. It is of interest that the eosinophilia in periarteritis nodosa is almost always seen in patients who have asthma or other pulmonary involvement.

Differential diagnosis. — At medical ward rounds three weeks before death: (1) periarteritis nodosa; (2) acute toxic neuritis; (3) subphrenic abscess; (4) arsenical polyneuritis; (5) diphtheritic polyneuritis.

Final diagnosis.—Noted on chart day before death, Dr. B. F. Paige, Resident in Medicine. "Periarteritis nodosa would seem to be the only condition that would fit all the facts."

POST-MORTEM FINDINGS (DR. H. K. FIDLER)

The body was that of a well developed but very poorly nourished man. The right lung weighed 710 grams, the left lung 360 grams. Minimal hypostatic bronchopneumonic changes together with some œdema and congestion were the only significant findings.

The heart weighed 320 grams. There were no significant macroscopic findings. The coronary arteries showed only minimal atherosclerosis. Microscopic examination showed several scattered vascular lesions significant of an active stage of periarteritis nodosa. The small arteries were affected. There was necrosis and fibrinoid degeneration of the media and subendothelial tissue with œdema of the media and adventitia. There was infiltration of all layers of the wall with polymorphonuclears, lymphocytes, plasma cells but only the occasional eosinophile. No thrombosis was found in any vessel. One vessel showed definite aneurysmal dilation.

The liver weighed 1,840 grams. There was a moderate degree of passive congestion and fatty metamorphosis. A few scattered lesions were found in the periportal connective tissue significant of an older, less active stage of periarteritis nodosa. In these there was marked thickening of the wall with fibroblastic proliferation of media and adventitia. There was narrowing of the lumen. The cellular infiltrate in the media and adventitia consisted of lymphocytes and plasma cells.

The kidneys each weighed 180 gm. The capsules stripped causing a slight amount of decortication. There were small irregular depressed cortical scars, otherwise the cortico-medullary portions were normal. Histological sections revealed characteristic lesions of periarteritis nodosa in the vessels of arcuate and interlobular size. Some of these lesions appeared almost inactive, while others showed varying degrees of necrosis and inflammation. There were no other significant lesions in the renal parenchyma.

Adrenals, pancreas, spleen, gastro-intestinal tract, bladder and prostate showed no significant pathological findings.

Peripheral nerves. — Histological sections of both sciatic nerves and the lumbar sympathetic trunk revealed a few scattered lesions characteristic of periarteritis nodosa involving small muscular arteries.

Brain revealed a region of hæmorrhage and softening in the right cerebral hemisphere. This

was 4 cm. in diameter and involved the internal capsule on that side. The cerebral vessels revealed no macroscopic lesion and histologic sections failed to reveal any vascular lesion in the region of the hæmorrhage or elsewhere in the brain.

In summary, this is a case of widespread vascular disease affecting the small and medium sized arteries of the heart, liver, kidneys, peripheral nerves and probably the brain. The pathological pattern is characteristic of periarteritis nodosa. The vessels in the various organs showed necrotic and inflammatory lesions in different stages and degrees of inflammation and healing. The ultimate cause of death was intracerebral hæmorrhage which, I believe, was probably on the basis of an aneurysmal rupture of a cerebral vessel involved by periarteritis nodosa.

TUBERCULOSTATIC ACTIVITY OF CERTAIN PRODUCTS OF GROWTH OF PENICILLIN NOTATUM

Harry C. Ballon, M.D. and Alfred Guernon

Department of Surgery, Jewish General Hospital, Montreal, Que.

INVESTIGATIONS dealing with the effects of the products of growth of *Penicillium notatum* upon tubercle bacilli have been concerned mainly with penicillin. Negative results have been reported by a number of investigators.[1, 13, 15, 16, 18, 19] It has been noted, however, that under certain experimental conditions, penicillin does exert some inhibitory effect upon the growth of tubercle bacilli.[5, 7, 9, 17]

Penatin, also known as notatin and penicillin B, was found ineffective *in vitro* but had a slight inhibitory effect upon the development of tubercles in the infected developing chick embryos.[16] These authors also reported that certain ether extracts of cultures of *P. notatum* grown on Raulin-Thom medium for 14 to 18 days gave "good inhibition of growth of tubercle bacilli"; similar extracts administered to tuberculous guinea-pigs produced "a slightly favourable effect" on the course of the disease. These extracts were not toxic.

Bonfiglioli and Acuna[2] observed that culture filtrates of a strain of *P. chrysogenum*, a species closely allied to *P. notatum*, grown on glycerol broth for 16 days, inhibited the growth of several strains of tubercle bacilli.

Our experiments are concerned chiefly with the tuberculostatic effects of culture filtrates derived from certain strains of *P. notatum* and mention will be made of the effect of penicillin B (notatin, penatin), upon the growth of tubercle bacilli.

Two strains of *P. notatum* were tested: NRRL 1249 B 21 and a variant derived from it. The former strain developed a conidial or C type of growth while the variant developed mainly as a mycelial or M type of growth. Most of the experiments were carried out with the variant strain which produced more acid on liquid media than did the parent strain.

The sporulation medium employed was a modified Hobby, Meyer and Chaffee medium.[6] We omitted the Fe SO4.7 H_2O and the KCl and added 1.75% agar to solidify. A variety of liquid media were tested including Czapek-Dox,[3] Raulin-Thom,[11] Moyer[12] corn steep and a citrate glucose medium (ammonium citrate 3 gm.; K_2HPO4 0.8 gm.; Mg SO4.7 H_2O 0.4 gm.; glucose 40 gm.; distilled water, one litre).

The experiments reported here refer to surface growth of the moulds. The moulds were grown at 24 and 28° C. In testing the culture filtrates against tubercle bacilli either one or both of Long and Dubos liquid media were used. With saprophytic acid fast bacteria both nutrient broth and the plate diffusion agar (disc) method were employed. The tubercle bacilli and other acid fast organisms tested were strains $H_{37}rv$, (human), $A._{77}$, (avian), strain 607 and MPhlei. The inoculum varied from 0.001 mgm. to 0.2 mgm. per 5 ml. of test culture.

Results.—At various intervals of growth of the moulds, in certain instances up to a period of 21 days, the filtrates were tested for their effects upon the growth of tubercle bacilli.

When grown on corn steep medium both moulds yielded filtrates which inhibited the growth of both human and avian tubercle bacilli in Long's medium. The inhibitory concentration was usually 1:6 although in some instances a concentration of 1:25 exerted a definite inhibitory effect. Inhibition coincided with the period of active penicillin formation, (6 to 9 days). Four and twelve days old filtrates showed little or no effect. The pH of the inhibitory filtrates were at or near neutrality. Although strain NRRL 1249 B 21 produced at least four times more penicillin than did the variant strain, no difference was noted in the degree of tuberculostatic activity of the filtrates produced by either mould.

The filtrates resulting from the growth of the moulds on Czapek-Dox and citrate glucose media showed that strain NRRL 1249 B 21 did not elaborate any tuberculostatic substances when grown on these media. The variant strain on the other hand did yield tuberculostatic filtrates on these media but not when grown

on Raulin-Thom medium. The inhibitory effect was noted at concentrations varying from 1:25 to 1:100. If the results were read early and the seeded inoculum relatively small (0.001 mgm.) marked inhibition was noted in the higher concentration; with larger inocula (0.2 mgm.) inhibition was noted at 1:25. Late readings showed that growth eventually developed. The filtrates were found to be inactivated in a short time when left at incubator temperature, (37° C.). The most potent filtrates were found in 6 days old culture; ten days old filtrates were slightly effective while those older than 14 days were no longer inhibitory. The inhibitory filtrates were more active when the mould developed at 28° C. than at 24° C. The effective filtrates had a pH varying between 3.0 and 4.0. The citrate glucose medium* was found more satisfactory than that of Czapek-Dox in the elaboration of tuberculostatic filtrates. No loss of activity resulted when the filtrates were heated for one hour at 56° C.

An extract was prepared from the filtrates of the variant grown for six days on citrate glucose medium. The extract consisted of the precipitate obtained by adding three volumes of acetone to the filtrate at pH 3.0 to 3.5; this precipitate was collected, dried *in vacuo* over P_2O_5 and kept at 5° C. The yield per litre of filtrate was approximately 55 to 60 mgm. of a light tan powder. The extract was found to inhibit the growth of tubercle bacilli in concentration of 1:200,000 to 1:500,000. A strain of *Staph. aureus* was inhibited at 1:100,000 or more when tested in nutrient broth; three strains of *E. coli* were not inhibited in a concentration of 1:5,000. The presence of glucose in the test medium was essential for the antibacterial effect. The toxicity of the extract was tested by subcutaneous injection into mice. It was found that the water soluble part of 4 mgm. of the extract was lethal; smaller amounts (0.5 mgm.) in divided doses were tolerated when given for eight days.

The requirement of glucose for antibacterial effect *in vitro* as well as the high toxicity *in vivo* suggest identity or close relationship of our extract to notatin (penicillin B penatin). Incidentally three lots of penicillin B† were tested for their action against tubercle bacilli. All of these preparations were found inhibitory to the growth of tubercle bacilli. One lot of penicillin B inhibited growth at a concentration of 1:4,000,000. Contrary to the statement of Moyer and Coghill we found that notatin, (penicillin B) does respond to the agar diffusion disc method.

* When levulose was substituted for glucose in the medium the filtrates were found inactive against tubercle bacilli.

† These preparations had lost some of their original potency after a few years of storage.

SUMMARY

Culture filtrates derived from the growth of two strains of *P. notatum* have been tested against tubercle bacilli *in vitro*.

Both strains yielded tuberculostatic filtrates when grown on corn steep medium.

Only one of the two strains produced tuberculostatic filtrates when grown on Czapek-Dox and a citrate glucose medium. Extracts prepared from citrate glucose filtrates possessed properties suggestive of notatin.

Notatin was found highly inhibitory to the growth of the tubercle bacillus.

We wish to acknowledge our indebtedness to Dr. Kenneth B. Raper of the Northern Regional Research Laboratories, Peoria, Ill., for supplying us with strains of *P. notatum*; to Dr. G. P. Youmans, Northwestern University, Chicago, Ill., and Wm. Steenken of the Trudeau Foundation, Saranac Lake, N.Y., for sending us various strains of acid-fast organisms; to Dr. P. A. Katzman of St. Louis University, for forwarding us several lots of Penicillin B.

We are particularly thankful to Professor J. H. Quastel, McGill University, for his invaluable advice and interest in our work.

REFERENCES

1. ABRAHAM, E. P., CHAIN, E., FLETCHER, C. N., FLOREY, H. W., GARDNER, A. D., HEATLEY, N. G. AND JENNINGS, M. A.: *Lancet*, **2**: 177, 1941.
2. BONFIGLIOLI, H. AND ACUNA, C.: *La prensa medica Argentina*, **35**: 325, 1948.
3. CLUTTERBUCK, P. W., LOVELL, R. AND RAISTRICK, H.: *Biochem. J.*, **26**: 1907, 1932.
4. COULTHARD, C. E., MICHAELIS, R., SHORT, W. F., SYKES, G., SKRIMSHIRE, G. E. H., STANDFAST, A. F. B., BIRKENSHAW, J. H. AND RAISTRICK, H.: *Biochem. J.*, **39**: 24, 1945.
5. COURMONT, P., GARDÈRE, H. AND DERIES, G.: *Comptes rend. de la Soc. Biol.*, **141**: 119, 1947.
6. HOBBY, G. L., MEYER, K. AND CHAFFEE, E.: *Proc. Soc. Exptl. Biol. Med.*, **50**: 285, 1942.
7. KIRBY, W. M. M. AND DUBOS, R. J.: *Proc. Soc. Exper. Biol. Med.*, **66**: 120, 1947.
8. KOCHOLATY, W.: *Arch. Biochem.*, **2**: 73, 1943.
9. ILAND, C. N.: *J. Path. & Bact.*, **58**: 495, 1946.
10. MOYER, A. J. AND COGHILL, R. D.: *J. Bact.*, **51**: 57, 1946.
11. OXFORD, A. E., RAISTRICK, H. AND SMITH, G.: *Chem. Ind. Trans.*, **61**: 22, 1942.
12. RAPER, K. B., ALEXANDER, D. F. AND COGHILL, R. D.: *J. Bact.*, **48**: 639, 1944.
13. RIVIÈRE, C., THELY, M. AND GAUTRON, G.: *Compt. rend. Acad. Sc.*, **224**: 1856, 1947.
14. ROBERTS, E. C., CAIN, C. K., MUIR, R. D., REITHEL, F. J., GABY, W. L., VAN BRUGGEN, J. T., HOMAN, D. M., KATZMAN, P. A., JONES, L. R. AND DOISY, E. A.: *J. Biol. Chem.*, **147**: 47, 1943.
15. ROBINSON, H. J.: *J. Pharmacol. & Exper. Therap.*, **77**: 70, 1943.
16. SMITH, M. F. AND EMMART, E. W.: *U.S. Pub. Health Rep.*, **59**: 417, 1944.
17. SOLOTOROVSKY, M., BUGIE, E. J. AND FROST, B. M.: *J. Bact.*, **55**: 555, 1948.
18. UNGAR, J. AND MUGGLETON, P.: *J. Path. & Bact.*, **58**: 501, 1946.
19. WOODRUFF, H. B. AND FOSTER, J. W.: *Proc. Soc. Exper. Biol. Med.*, **57**: 88, 1944.

1414 Drummond St.

THE NEW CONCEPT OF CONGESTIVE FAILURE

G. F. Strong, M.D.

Vancouver, B.C.

THE old idea that heart failure was the result of weakening of the heart muscle resulting in a reduction in cardiac output and followed by a backing up on the venous side of the systemic circulation is no longer adequate to explain the complex nature of all the manifestations of congestive failure. This theory of so-called "backward failure" suggested that passive congestion of the lungs, the liver, the gastro-intestinal tract, and the kidneys, accounted for most of the symptoms encountered in the terminal stages of chronic failure. Œdema according to earlier views was a simple matter of increased hydrostatic pressure and increased capillary permeability leading to escape of fluid into the tissue spaces. Such a simple explanation can no longer be accepted.

While it is true that increased venous pressure leads to increased diastolic filling, and this in fulfillment of Starling's law will cause increased cardiac output, such reasoning probably is valid only for the initial stages of heart failure. When the heart muscle becomes fatigued the dilatation of the ventricles with the stretching of the fibres goes beyond the point where adequate oxygen consumption by the muscle fibres can be maintained.

It is now well recognized that there are limitations to the clinical correlations that are possible from Starling's observations on heart-lung preparations. The experimental production of heart failure has offered considerable difficulty. Local injury to the ventricular walls by burning[1] and coronary ligation[2] even where large areas were involved have failed to produce the picture of congestive failure. Embolization of the coronary vessels by starch granules[2] has been successful. Studies of circulation and the mechanism of heart failure[3] have been improved by cardiac catheterization, whereby with the catheter in the right heart, the application of the Fick principle has given accurate figures for cardiac output. According to the Fick principle the cardiac output is calculated from the difference between the oxygen content of the venous blood taken from the right heart, and that of the arterial blood taken from a systemic artery, and the total oxygen consumption.[4]

Such studies[3] have indicated that in congestive heart failure cardiac output may be normal, decreased or increased, and that in heart disease it is possible to have a similar range of cardiac output with or without failure. In congestive failure clinical improvement may occur with an increase, a decrease, or without change in the output. While it is true that for the majority of cases of congestive failure seen in practice, that is, those due to arteriosclerotic, hypertensive, and rheumatic heart disease, the cardiac output is reduced below the average normal figure of 3.3 litres per minute, per square metre of body surface (range 2.3 to 4.1), there are other cases of congestive failure in which the output is definitely raised above normal, the so-called "high output failure" cases. These include patients with anæmia, hyperthyroidism, arterio-venous communication, including patent ductus arteriosus, beri-beri, and some cases of cor pulmonale. It must be pointed out that even in these patients with raised output there is a relative insufficiency of blood pumped out of the left ventricle to satisfy the body needs. This relative insufficiency may depend on the inadequacy of the blood itself as in anæmia, or on the increased tissue needs as in hyperthyroidism, or on a wastage through arteriovenous communication as in A-V fistulæ, patent ductus arteriosus, or in some cases of Paget's disease.

Normally the output of the left and the right ventricle is the same with each beat, somewhere in the vicinity of 80 c.c. When left ventricular failure occurs there is a reduction in output of the left ventricle with a rise of pressure in the pulmonary veins and left auricle. At first this will operate to increase diastolic filling and increase cardiac output, but in chronic failure there is soon set up a "backward failure" of the left ventricle with increased venous pressure through the right heart to the systemic veins. The increase of blood volume known to occur with congestive failure will augment this effect. This increased blood volume accounts in part for the increased "static pressure" found by Starr[5] in patients dying of congestive failure. The cause of the increased blood volume is in part, sodium retention and in part the stimulating effect of anoxæmia on the bone marrow. Venous pres-

sure is increased not only by the "backward failure" of the heart, which may play little part, but by the increase in blood volume, by increase in pressure on the vessels, especially veins, by hydrothorax or ascites, and by venoconstriction. The principal defect in this type of congestive failure is in ventricular emptying. Exercise in normal individuals causes a rise in cardiac output whereas in failure it causes a decrease. Venesection in normal individuals produces no change in cardiac output whereas in a patient with "low output" failure withdrawal of blood causes an increase in output.

McMichael[6] has done much to improve our understanding of the venous congestion occurring in heart failure, and has pointed out that there is an active venomotor control which with the blood volume determines the degree of venous filling. He has further referred to the work of Lysholm and his associates which indicates that there is a considerable volume of blood in the ventricles and in the auricles at the end of their respective diastoles. There is an estimated 50 c.c. in each ventricle and about 35 c.c. in each auricle, and since the stroke output of the ventricles is in the neighbourhood of 80 c.c. the capacity of these chambers must be around 130 c.c. for ventricles and 115 c.c. for auricles. McMichael[6] has diagrammatically shown the events in a normal heart, in the transition to failure, and in the vicious circle established in the congestive state.

Our present understanding of the mechanism of salt and water retention as already indicated has become completely altered. In "low output failure" the renal plasma flow is reduced from one-third to one-sixth of normal, whereas the reduction of cardiac output is seldom less than one-half normal. The kidney may therefore receive an average of only 8 to 10% of the cardiac output rather than the normal 20 to 25%. This shunt away from kidney may be in part compensatory to maintain adequate circulation to the brain and other organs. If the reduction of renal blood flow resulting from vasoconstriction of afferent arteries is maintained for long irreversible damage may occur. Even in "high output failure" this renal vasoconstriction occurs. With the fall in renal plasma flow the glomerular filtration rate is affected and less sodium is excreted. With the rise of venous pressure on the systemic side, including the renal veins, there is a possibility that an increase in tubular absorption of sodium and water may occur.

The reduced glomerular filtration and the increased tubular absorption if the latter occurs lead to the sodium retention which is now recognized as the most important biochemical change in congestive failure. In addition to the renal factor there is some evidence that disturbance of adrenal function may augment sodium retention. The effect of anoxia on the pituitary, particularly the pars intermedia may stimulate the production of the antidiuretic hormone and lead to water retention to further aggravate the congestive state. There has been some argument as to whether salt and water retention is a useful compensatory mechanism to provide a blood volume sufficient to maintain the venous pressure required for adequate diastolic filling, or whether it is due to an error in metabolism. Merrill[7] believes the latter more likely since most patients under treatment for congestive heart failure feel better as venous pressure returns to normal, and if this increased venous pressure was compensatory or beneficial the reverse would be true.

The old concept of congestive failure was the so-called "backward failure". The newer concepts indicate that there is also a "forward failure" which develops as a result of the reduction in cardiac output which leads to decreased renal blood flow with resulting sodium retention. This is followed by increased blood volume and as a final instead of initial stage, a raised systemic venous pressure. Anoxia has been shown to stimulate the bone marrow to increased hæmopoiesis which must be an added cause of the increased blood volume. It is, of course, quite possible to get a combination of "backward" and then "forward" failure.

The implications of these new ideas on treatment are obvious. In the first place rest is still of prime importance in the management of congestive heart failure. Since in all cases of heart failure the cardiac output is relatively, if not actually, below normal, there is need for reducing the demands on the circulation which can best be done by putting the patient to bed in a comfortable position. Rest is also important in relation to disturbed renal function.

Salt restriction is equally desirable in those patients with œdema that does not respond to rest and digitalis since, as has been shown, there is a definite sodium retention in cardiac

congestion. The extent of the salt restriction is a matter of judgment but it is certainly not sufficient to advise only that no added salt be used. A diet low in sodium containing foods, and including the use of salt-free bread and butter is desirable. Such diets are to be found in any of the recent textbooks devoted to diet.

The use of salt substitutes may be justified when these are necessary to encourage an adequate intake in the undernourished cardiac patient. Recent experience has clearly shown that the use of lithium-containing substitutes is unwise. Schemm[8] has pointed out the importance of restricting the use of sodium in any form, as in alkaline stomach powders, or other sodium-containing medicaments. There can be no doubt that the present day management of the congestive state with œdema requires intelligent control of sodium intake.

The question of the desirable fluid intake permits some latitude. There was a time when routine treatment of the œdematous patient included limiting fluid intake to 900 or 1,000 c.c. or less. Actually, of course, the measurement of fluid intake is a grossly inaccurate determination since the water content of the food is usually disregarded, and since it is difficult, if not impossible, to maintain an accurate record of intake and output even in the best of hospitals. The use of large amounts of fluid, including parenteral injection if the patient is unable to drink the so-called optimum amount, has not seemed warranted. The present view that the patient under treatment for relief of dropsy should be allowed fluids as desired is most satisfactory. It is surprising to note that the majority of such patients are satisfied with amounts in the neighbourhood of 1,500 c.c. in 24 hours. The so-called "agonizing" thirst of the "fluid restriction" era was probably partly psychic.

Digitalis remains the chief drug in the treatment of heart failure and there has been little change in the concept of the action of the whole leaf, which according to McMichael[6] not only increases cardiac output by a direct action on the heart muscle, but may exert a veno-dilating effect on the systemic veins. The same author thinks that ouabain causes a rise in cardiac output prior to any change in venous pressure, whereas digoxin reduces the venous pressure without significant change in output. The dosage of digitalis is still subject to some latitude but it is none the less important to give enough of the drug to accomplish the desired result. As ordinarily used in congestive failure digitalis is given to a patient with an increased apex rate and an irregular rhythm. For the majority the use of the 0.1 gm. (or grain 1½) tablet of powdered leaf is most desirable, and the best dosage is two of these tablets every four hours until the apex rate has been reduced to the desired level, then gradually reducing to a maintenance dose of one tablet once or twice a day as required. There are certain advantages in the use of digitoxin or digoxin in some few cases, but these preparations should not displace the tablet of the powdered leaf for general use.

The mercurial diuretics act, as has been well known, to inhibit tubular absorption, and have been shown to increase sodium excretion by as much as 24 times.[9] These diuretics also reduce venous pressure and increase cardiac output by a venesection-like action in reducing the blood volume at the peak of the diuresis. The mercurials are now all combined with a xanthine preparation and should be given after and during the exhibition of ammonium chloride, or other acid salt. The injections intramuscularly or intravenously should be given every other day until the desired result is achieved. The best method of following the improvement in an œdematous patient is to weigh him every day. When his weight becomes stationary it is certain that all the excess fluid including the occult œdema has disappeared.

Herrmann[9] has recently described a new diuretic, thiomerin, which may be given subcutaneously alone or combined with ammonium chloride.

Venesection with the removal of 250 to 300 c.c. (8 to 10 oz.) of blood should be employed more frequently. The resulting mechanical reduction in venous pressure combined with the somewhat similar effect of digitalis and the mercurial diuretics on venous congestion will usually produce great relief of the symptoms of the congestive state. In patients with anæmia with hæmoglobin values of 11 grams or less for men, and of 10 grams or less for women, or if the hæmoglobin is reported in percentage, in those showing less than 75 or 80%, the removal of this amount is probably unwise. In these instances the application of

tourniquets to the extremities may serve the same purpose.

Since anoxia plays an important part in the complex picture of congestive failure the therapeutic use of oxygen in this condition is well established. While it may be given by several methods the newer tents are probably most comfortable to the patient, and are effective if adequately adjusted, and if maintained with a flow of oxygen of 10 or 12, or better 15 litres per minute.

Pulmonary œdema which is probably a form of acute left ventricular failure may present as an alarming cardiac emergency. The response of this syndrome to the use of morphine is usually dramatic, the drug can be given in 0.15 mgm. (gr. ¼) doses subcutaneously or intravenously. In addition the use of aminophylline 0.25 to 0.5 gm. intravenously, oxygen and venesection may also be required.

SUMMARY

The older concept of congestive heart failure is no longer tenable.

"Low output", the common form of failure, occurs in most cases of arteriosclerotic, hypertensive, and rheumatic heart disease.

Examples of "high output failure" are to be found in anæmia, hyperthyroidism, arteriovenous communication, beri-beri, and cor pulmonale.

Sodium retention is principally a result of alteration of intrarenal circulation, and is one of the causes of increased blood volume.

Venous congestion is due to more than "backing up" behind the "weakened" heart. It is the result in addition of the increased blood volume and of some veno-constriction.

Both "backward" and "forward" failure may be present in any given congestive state.

Brief comment is made on the relation of the newer concepts to therapy.

REFERENCES

1. STARR, I., JEFFERS, W. A. AND MEADE, R. H.: *Am. Heart J.*, **26**: 291, 1943.
2. ROSS, A. AND SMITH, J. R.: *Am. J. Physiol.*, **153**: 558, 1948.
3. PAINE, R. AND SMITH, J. R.: *Am. J. Med.*, **6**: 84, 1949.
4. BEST AND TAYLOR: Physiological Basis of Medical Practice, Williams & Wilkins Co., Baltimore, 4th Ed., p. 228, 1945.
5. STARR, I. AND ROWAN, A. J.: *Am. J. M. Sc.*, **199**: 40, 1940.
6. MCMICHAEL, J.: *Am. J. Med.*, **6**: 651, 1949.
7. MERRILL, A. J.: *Am. J. Med.*, **6**: 657, 1949.
8. SCHEMM, F. R.: *Ann. Int. Med.*, **21**: 937, 1944.
9. HERRMANN, G. R.: *J. A. M. A.*, **140**: 509, 1949.

CASE REPORTS

THIOURACIL AGRANULOCYTOSIS

Eric R. Gubbay, M.D.(Lond.), M.R.C.P.(Lond.)

Winnipeg, Man.

This paper records two case reports of agranulocytosis due to derivatives of thiouracil and evaluates some features of this condition. As it is true that gross granulocytopenia and agranulocytosis have a similar threatening aspect no effort is made to draw distinctions between these terms.

CASE 1

Miss S.L., aged 16. This patient had had moderate thyrotoxic symptoms (B.M.R. plus 21%) for about 6 weeks before the end of September, 1947, at which time she was admitted to hospital. After preliminary demonstration of a normal blood picture therapy with methyl thiouracil 200 mgm. t.i.d. was commenced on October 9. Progress was satisfactory until October 14, when there was a sharp rise of temperature to 101.4° F. Methyl thiouracil was discontinued. The fever, headache and sweating persisted throughout the 15th and 16th. On the 15th the white cell count was normal (5,100 per c.mm. polymorphonuclear (P) 76%) but on the 16th it showed a delayed fall to 1,700 per c.mm. P 17%.

Therapy with penicillin and pentnucleotide was commenced and was accompanied by a rapid reversal of all symptoms and signs. On October 24 and again on October 30 a detailed analysis of her blood picture was normal. On the latter date a single test dose of 50 mgm. of methyl thiouracil was given. Five hours later she had a sharp febrile reaction with headache, weakness and lethargy. Penicillin was used again and the drug fever settled rapidly. Total and differential white cell counts were done five times in the next ten days. No significant granulopenia was discovered.

CASE 2

Mrs. E.C., aged 39. This patient presented as a typical case of thyrotoxicosis with symptoms of about two years' duration. The sleeping pulse rate was 100 and the basal metabolic rate plus 28% on admission to hospital April 2, 1948. After preliminary demonstration of a normal blood picture therapy was commenced with methyl thiouracil 200 mgm. t.i.d.

The accompanying diagram shows that a drug fever was noticed after eight days of this treatment. It also shows the subsidence of the fever on drug withdrawal and the relapse following a test dose of 200 mgm. No granulopenia was seen in this period. Subsequently propyl thiouracil was prescribed. It caused a granulopenia without any drug fever. Again drug withdrawal caused a rise of white cell count and a test dose caused a sharp fall in the granulocyte count.

The following study was carried out on May 12, 1948, the day after the last dose of propyl thiouracil.

A.M. blood count.—White blood cells 4,200 per c.mm., polymorphonuclears 6%, lymphocytes 71%, monocytes 22%, eosinophiles 1%.

Five p.m. blood count.—White blood cells 4,300 per c.mm., polymorphonuclears 23%, lymphocytes 61%, monocytes 11%. At 5.40 p.m. the patient was given one ampoule of antistin (100 mgm.) intravenously and the following blood counts were subsequently obtained.

6.30 p.m. white blood cells 4,400 per c.mm., polymorphonuclears 20%, lymphocytes 76%, monocytes 4%.

7.30 p.m. white blood cells 5,300 per c.mm., polymorphonuclears 30%, lymphocytes 57%, monocytes 8%, eosinophiles 4%.

8.30 p.m. white blood cells 5,200 per c.mm., polymorphonuclears 24%, lymphocytes 63%, monocytes 7%, eosinophiles 2%.

All therapy with any thiouracil derivative was then abandoned. The blood picture reverted to normal as is seen in the diagram.

DISCUSSION

Agranulocytosis in allergic disease.—In 1934 Madison and Squier[4] showed that drug-induced agranulocytosis is an allergic disease. More recently sulfonamide agranulocytosis has been shown to be caused by the same mechanisms. Subsequently Nixon, Eckert and Holmes[7] published records of their successful experiment of persisting with sulfadiazine in spite of a drug-induced agranulocytosis. These authors were not concerned with the allergic mechanisms now under scrutiny but in terms of such mechanisms they had desensitized their patients who recovered with a reversal of the granulopenia. Later Park[8] was able to plan and carry out the deliberate desensitization of his patient with sulfonamide neutropenia. Similar facts are reported in the literature and the case reports above indicate the allergic nature of the drug fever and the neutropenia due to the derivatives of thiouracil. It is seen that considerable toxic effects can be produced by administering small test doses after a suitable period of drug withdrawal. Further, Astwood[2] has published a report of what he considered to be the desensitization of a case with thiouracil drug fever. It may be concluded that thiouracil agranulocytosis is an example of drug allergy.

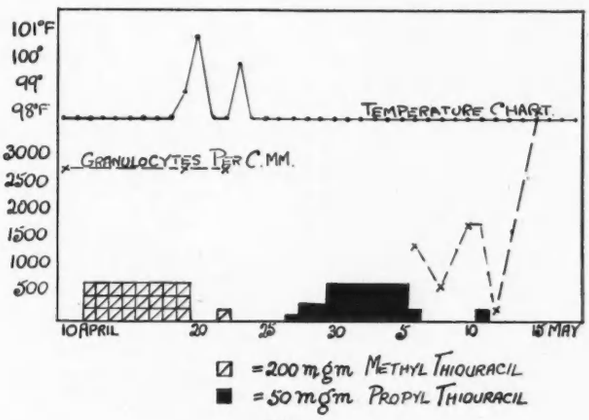


Fig. 1

Allergic reactions are acquired after a suitable interval during which the individual is being rendered sensitive. It is noteworthy that the reactions recorded above occurred about seven days after the initiation of treatment. This contrasts with the report by Moore[5] who concluded that the period of maximum leucopenic and of maximum granulopenic incidence is from four to eight weeks after the start of thiouracil treatment. The same writer adds "It is significant that no leucopenias were reported as occurring less than 25 days after the initiation of treatment, with the one exception of a patient previously treated with thiouracil without reaction". But Case 1 clearly shows the occurrence of considerable neutropenia six days after the initiation of treatment with methyl thiouracil. Case 2 shows the incidence of neutropenia ten days after the start of propyl thiouracil therapy. Here it is possible, however, that the previous dosage of methyl thiouracil had some part to play in the sensitizing process.

Antihistamine substances.—Arbesman *et al.*[1] and Hunter and Hill[3] published early reports of the use of antihistamine substances in the successful management of liver sensitivity and of insulin sensitivity. It is probable that the mechanisms of liver and of insulin sensitivity are not the same as those that operate in drug-induced granulopenias. Nevertheless the latter are reactions of an allergic nature and so in Case 2 reported above antistin was injected intravenously. It is evident that it had no apparent effect on the spontaneous recovery which was taking place at the time.

Propyl thiouracil.—There is general agreement that propyl thiouracil is the safest of the drugs of this family. This has also been the writer's experience. But the drug is not completely without danger. Case 2 reported above shows that severe granulopenia may result due to propyl thiouracil. A point of major interest in this report is that methyl thiouracil caused an obvious drug fever whereas propyl thiouracil caused a latent granulopenia that was discovered only on a routine blood count.

Delayed drug reactions.—Case 1 demonstrates the interesting phenomenon of a delayed fall in the leucocyte count. This occurred more than 24 hours after therapy had been discontinued because of the warning of a drug fever. The importance of the observation is obvious when we note that similar experiences have been recorded by others. Thus Plum[10] found that in the experimental production of agranulocytosis the lowest granulocyte count occurred on days varying from the first to the eighteenth after the last dose of amidopyrine. Both Pearson[9]

and Nicol and Freedman[6] have recorded reports of omitting sulfonamide on the 23rd day of treatment. In each case the first warning of a fatal agranulocytosis did not occur until seven days later.

SUMMARY

Two case reports of agranulocytosis due to thiouracil derivatives are published. In one patient propyl thiouracil proved more dangerous than methyl thiouracil.

The allergic nature of agranulocytosis is discussed and demonstrated. Antistin was used in one of the cases reported in an effort to reverse a drug induced granulopenia. It had no apparent effect.

Acknowledgment is gladly made to Dr. Hugh Gainsborough, F.R.C.P., of St. George's Hospital, London, England, for permission to publish these case reports and to the hæmatological department of that hospital for the blood counts.

REFERENCES

1. ARBESMAN, C. E., KOEPF, C. F. AND LEUZMER, A. R.: *J. Allergy*, 17: 275, 1946.
2. ASTWOOD, E. B.: *J. Clin. Endocrinol.*, 4: 229, 1944.
3. HUNTER, R. B. AND HILL, A. G. S.: *Lancet*, 2: 383, 1947.
4. MADISON, F. W. AND SQUIER, T. L.: *J. A. M. A.*, 102: 755, 1934.
5. MOORE, D.: *J. A. M. A.*, 130: 315, 1946.
6. NICOL, H. AND FREEDMAN, B.: *Lancet*, 2: 647, 1939.
7. NIXON, N., ECKERT, J. F. AND HOLMES, K. B.: *Am. J. M. Sc.*, 206: 713, 1943.
8. PARK, R. G. A.: *Lancet*, 1: 401, 1944.
9. PEARSON, H. E. S.: *Brit. M. J.*, 1: 1031, 1939.
10. PLUM, P.: Clinical and Experimental Investigations in Agranulocytosis, H. K. Lewis & Co., London, 1937.

Mall Medical Group,
Memorial Blvd. at St. Mary's.

BLOOD CALCIUM IN MULTIPLE MYELOMA*

Charles A. Allard, M.D., F.R.C.S.[C.] and C. Lefebvre, M.D.

Edmonton, Alta.

Elevation of blood calcium is known to occur in some cases of multiple myeloma. However standard reference books usually fail to state that the degree of elevation of blood calcium may be very high and may even exceed the levels occurring in hyperparathyroidism. For this reason patients with multiple myeloma showing raised blood calcium values may be wrongfully considered to be examples of osteitis fibrosa cystica, and subjected to fruitless exploration of the neck for parathyroid tumour.[1]

* From the Edmonton General Hospital.

The patient whose history is summarized below and who subsequently proved to have multiple myeloma, showed calcium blood levels persistently above 16 mgm. % together with generalized decalcifying bone lesions. This patient ultimately developed a blood calcium level of 20 mgm. % and similar high elevations have been recorded by North,[1] Lichtenstein and Jaffe,[2] Barr and Bulder,[3] Caylor and Nickel,[4] and Enzner and Lieberman.[5]

J.B., admitted to the Edmonton General Hospital, January 29, 1949. The immediate cause for admission was a generalized skin eruption with pruritus. During the previous six months he had lost forty pounds in weight and complained of severe pain in the lumbar region and over the lower rib margins, together with progressive weakness which had confined him to bed for several weeks prior to admission.

Physical examination showed an emaciated man looking older than his fifty-five years. He had tenderness over the sternum and ribs together with hyperactive reflexes and a skin rash characteristic of infectious eczematoid dermatitis.

Subsequent hospital course. X-ray examination showed generalized patchy areas of decalcification of the skeleton, including skull, long bones of the hands and feet, ribs, sternum, pelvis and vertebral column. A bone marrow biopsy from a lumbar vertebra was done two days after admission but failed to reveal evidence of multiple myeloma. Examination of the blood revealed a calcium level of 16.4 mgm. %, inorganic phosphorus 3.21 mgm. %, alkaline phosphatase 2 units, blood urea 58 mgm. %, and serum proteins of 5.9 gm. % with normal albumin-globulin ratio. A positive Sulkowitch test showed increased calcium excretion and intravenous pyelography demonstrated very poor renal output. Because of the high calcium level the diagnosis was considered to be hyperparathyroidism. However before exploring the neck for a parathyroid adenoma, a bone marrow biopsy was done, removing cortical bone and a generous biopsy of marrow showed conclusive evidence of multiple myeloma. The remaining course in hospital was rapidly downhill with the blood calcium rising to 20 mgm. % before his death on February 13, 1949.

COMMENT

The high level of blood calcium in this patient was at first believed to be compatible only with a diagnosis of hyperparathyroidism. Fortunately a bone marrow biopsy proved this to be a case of multiple myeloma before the neck was needlessly explored for a parathyroid adenoma.

It is significant to note that in spite of a very high calcium level the alkaline phosphatase was normal. According to Lichtenstein and Jaffe this is usually the case in multiple myeloma when the blood calcium is raised. It was because of the normal phosphatase level that a bone marrow biopsy was performed before exploring the neck. It is worthy of note that the rib biopsied was selected for convenience of operative exposure only, rather than a rib that appeared to be grossly involved.

REFERENCES
1. NORTH, J. P.: *Jour. Surg.*, 33: 563, 1936.
2. LICHTENSTEIN, L. AND JAFFE, H. L.: *Arch. Path.*, 44: 207, 1947.
3. BARR, D. P. AND BULDER, H. A.: *Am. J. M. Sc.*, 179: 449, 1930.
4. CAYLOR, H. D. AND NICKEL, A. C.: *Ann. Surg.*, 97: 823, 1933.
5. ENZNER, N. AND LIEBERMAN, B.: *Ann. Int. Med.*, 8: 1062, 1935.

10114 Jasper Ave.

CLINICAL and LABORATORY NOTES

ŒSTROGEN ABSORPTION AND TOXICITY IN MALE WORKERS IN A CHEMICAL PLANT*

Guy H. Fisk, M.D.

Mount Royal, Que.

In any industrial plant there are a number of operations which cause mild toxic symptoms if adequate precautions are not taken. This applies more especially to the pharmaceutical industry where numerous potent and concentrated drugs are handled for long periods of time. Accordingly, all employees of the large chemical plant in mind are carefully instructed in the handling of the drugs with which they come in contact. Showers, gloves, masks, overalls, exhaust fans and air-conditioning are distributed throughout the buildings where required. In spite of this the medical department of the Company sees from time to time cases of toxic reactions to some drug where the workers have become careless in following the proper routine. In this connection five cases were seen in workers with œstrogens. These cases all developed over a period of three months and are similar to though not identical with the case reported by the Goldziehers.†

Five out of fifty odd men who worked with mixed œstrogens, mixed œstrogen sulphates and crystalline œstrogens developed the toxic symptoms. These five employees ranged from college graduates to day labourers, and all complained of the same presenting symptom. This was gynæcomastia. They all had one or both breasts enlarged and painful. Examination showed an enlarged palpable nodule of firm consistency which was freely movable. The nodule was about 1½ inches in diameter and 1 inch thick. It was not attached to the skin or to the pectoral muscles. There was no discharge and no pigmentation of the areola, unlike the case described by the Goldziehers.

Further inquiry brought out the fact that these patients suffered from a slight loss of libido. True impotence did not occur but the frequency of intercourse was reduced. Sperm counts remained normal and one of the patient's wives became pregnant during the period under consideration. No atrophy of the genitalia such as the Goldziehers describe was seen. The testes remained firm and did not decrease in size.

General physical examination was otherwise negative. No changes in weight occurred. The blood pressure remained normal. Blood counts including red, white, differentials and hæmoglobin showed no changes from the previous checks made during the periodic annual examinations. There was no evidence of any solvent toxicity detected in any of the five.

Urinary assays for œstrogens were all greatly raised, being from 0.298 mgm. to 0.400 mgm./24 hr. sample. This is about ten times the normal average seen in males.

The patients all returned to normal after being taken off the œstrogen work for from 1 to 2 months. No active treatment of any kind was given. One patient developed an acute appendix while under observation and this was successfully removed without any complication developing.

On making careful checks it was found that from long familiarity with the œstrogens these five patients had become a little casual in dealing with them and neglected taking the routine precautions. They were actually getting their hands contaminated with the material. Absorption was evidently by two means: part of it was percutaneous while part was by ingestion from material getting on to the fingers and from them to the mouth. No headaches were reported in any of the cases although this was an important feature of the Goldziehers' case. The average length of exposure was about six months and the predominating œstrogens were œstrone or its conjugated form.

No evidence could be adduced to show that one physical type was more susceptible than another, since both the most masculine and feminine types of build were amongst those affected. Carelessness is the one common factor in these cases and far more important than sensitivity. This experience shows that even amongst the top chemists constant vigilance and policing are necessary to be sure that routine precautions are being followed when dealing with concentrated drugs. It is most necessary in such drugs as are cumulative and delayed in their effect. Continued reemphasis of the need for taking routine precautions is the only solution available at the present time and with the present techniques used in manufacture of natural hormones.

I wish to thank Dr. A. D. Odell of Charles E. Frosst and Co. for the urinary assays and helpful notes regarding the actual chemistry of the œstrogens.

592 Walpole Ave.

* From the Medical Department of Messrs. Chas. E. Frosst & Co., Montreal.

† Percutaneously Absorbed Œstrogens, Goldzieher, M. A. and Goldzieher, J. W., *J. A. M. A.*, **140**: 1156, 1949.

THE CANADIAN MEDICAL ASSOCIATION

Editorial Offices—3640 University Street, Montreal

(Information regarding contributions and advertising will be found on the second page following the reading material.)

EDITORIAL

OCCULT BLOOD IN FÆCES

RECENT campaigns have made both physicians and the public increasingly "cancer conscious", so that screening tests for the early detection of cancer are of paramount importance. As regards the gastro-intestinal tract, it has long been recognized that examination of the fæces for gross blood (melæna) and occult blood should always be done before considering more expensive and time-consuming examinations. Examination of the fæces for occult blood has been practised for many years, and at least three methods are in common usage, the benzidine, orthotolidine, and guaiac tests. However Hoerr, Bliss, and Kauffman, of the Ohio State University College of Medicine, in a survey of the available literature[1] were unable to find a single study evaluating the usefulness of such tests as an adjunct to a complete diagnostic work-up, comparable to the universally employed blood count and urinalysis. They therefore completed a thorough study of the methods and significance of tests for occult blood in the fæces. Their conclusions are of considerable clinical significance.

The standard requirement of a meat-free diet for several days beforehand was regarded as out of the question if the test was to be used widely without specific indications. In their study of 264 stool specimens collected from 140 unselected hospital patients with all varieties of illnesses, no patients had any dietary restrictions not imposed by the nature of their illness, and the stools were taken as they came.

The three commonly used reagents were tested *in vitro* for sensitivity to blood. Sensitivity in 60 seconds was roughly as follows: benzidine was positive in 1:100,000 dilution, orthotolidine in 1:20,000 dilution, and guaiac in ranges from 1:1,000 to 1:5,000 depending on the age of the blood and the hæmoglobin concentration. It was verified that ferrous sulphate taken orally in sufficient amounts to result in a black stool will produce a weakly positive guaiac test. (Benzidine does not react with iron.) Ferrous sulphate *in vitro* gives a positive guaiac test in concentrations of 1:50.

On examining the initial stool specimens of 92 unselected hospital patients, none of whom had been on any special diet, it was found that 95% were positive by the benzidine test, 87% by the orthotolidine test, and 22% by the guaiac test. It was therefore concluded that the benzidine and orthotolidine tests are too sensitive to be useful reagents for routine testing of stools from patients who have not been prepared with a meat-free diet, and that the guaiac test is not too sensitive for use on stools from unprepared patients eating their usual food. The guaiac test was found to be valid when performed on fæces smeared directly on to filter paper, and may be used on fæces from a rectal glove. This test is suitable for office use, requiring only three easily obtainable reagents which retain their stability for at least one month. In a positive guaiac reaction, there must be a definite change to blue or dark green within thirty seconds after the hydrogen peroxide is added. Positive guaiac reactions denote significant organic bleeding in a high proportion of cases. However, negative guaiac reactions do not rule out the existence of organic disease of the gastro-intestinal tract, including malignant growth.

Because of the simplicity of the guaiac test and the relative clinical accuracy of a positive reaction, Hoerr and his co-workers recommend the routine use of the test on a par with the blood cell count and the urinalysis.

1. HOERR, S. O. *et al.*: *J. A. M. A.*, **141**: 1212, 1949.

EDITORIAL COMMENTS

Income Tax Information

Attention is drawn to the summarized information which appears under Association Notes in regard to income tax returns made by members of the medical profession. Certain changes have been made: (*a*) in calculating depreciation on capital assets the so-called "Capital Cost allowance"; (*b*) in regard to claiming for expenses in relation to operation of a motor car in medical practice. It is no longer permissible to claim expenses on a mileage basis. All such claims must be based on actual costs of operation, plus depreciation. Furthermore the 75% of the total mileage of a car operated partly for professional work and partly for pleasure is no longer taken into account. Instead, only that portion of the auto-

mobile expenses incurred in earning the income from practice may be claimed as an expense, and therefore the total expense must be reduced by the amount applicable to personal use. It is also to be noted that no reference is made to any maximum figure for the cost of a motor car upon which depreciation will be allowed.

The allowances made for attending conventions remain as before.

The Committee on Income Tax of the Association has made representations to the responsible ministers with regard to postgraduate expenses, retirement funds and other matters of interest to the profession. At the moment however, nothing definite can be said on these points. The returns from 1949 will be made in accordance with the provisions of the material now published.

Abuse of the Antihistaminics

It is to be hoped that the tidal wave of antihistaminics medication for the common cold has subsided, at least from the peak of its height. These drugs have their place, and are of great value in symptomatic relief of hay fever and of the congestive features of allergic conditions: their sedative effect is also unquestionable. But they do not bring us any closer to the control of the common cold, and insofar as the virus element of that is concerned, are not likely to do so.

It is difficult however to separate in the lay mind the effects on symptoms from those on the causative element, and unfortunately there has not been enough control of the antihistaminics to prevent people from using them indiscriminately, quite apart from the baseless and inordinate claims made in some advertisements. The possible effects of drowsiness, giddiness, etc., become a very real danger since many people go about whilst taking the drugs.

We should make a point of stressing the fact that these drugs do not have any effect on the virus of the common cold, and also urge that their indiscriminate use is dangerous.

Fat Emulsion for Intravenous Nutrition

One of the problems of total intravenous alimentation is that sufficient calories cannot be administered by this route to meet daily requirements. That is, 2,000 c.c. of a 10% glucose solution and 1,000 c.c. of a 5% protein hydrolysate preparation provide only approximately 1,000 calories and 50 grams of protein, which will not prevent weight loss in an adult (or maintain positive nitrogen balance). In many patients also it is not possible to administer large quantities of intravenous fluids daily, due to congestive heart failure, decreased renal function, or œdema. The well known tendency of 10% glucose and protein hydrolysate preparations to sclerose the superficial veins through which they are administered, is another problem encountered in parenteral feeding. In attempts to find an answer to these problems, various investigators have searched for more concentrated solutions which would provide more calories per c.c. Dr. R. P. Geyer and his co-workers have been pioneers in the development of intravenous fat emulsions suitable for use in man. Recently* their tenth publication has appeared, summarizing their results with Emulsion 41 in 11 patients with a variety of clinical conditions requiring parenteral feeding.

Emulsion 41 consists of 15% cocoanut oil, 4.3% dextrose, and a combination of 0.5% soybean phosphatides, and 1% polyglycerol esters as stabilizers. The size of the fat particles of this emulsion is below 1μ in diameter for the most part and none were larger than 3μ. Previous studies in the dog and rat have shown conclusively that such fat emulsions of fine particle size introduced directly into the systemic circulation are utilized for energy purposes, as indicated indirectly by total carcass analysis for fat, maintenance of normal weight, conversion of negative to positive nitrogen balance on a low-protein low-calorie ration, and growth of puppies, and directly by radioisotope studies showing that C^{14} introduced as part of the fat molecule in a fat emulsion is rapidly eliminated in the expired CO_2. In previous studies with experimental animals and man, it has been shown that fat emulsions such as have been employed in the studies can be given safely without producing pathological conditions.

The present report from Dr. Geyer and coworkers concerns observations on the intravenous administration of a 15% fat emulsion to 11 patients with a variety of common illnesses. Of these patients, 8 were adults, 2 were children, and one was a 7-week old baby. The emulsion furnished 1,600 calories per litre and was given at rates ordinarily used for administering glucose or saline solutions. Daily amounts up to 3 gm. fat per kg. body weight were given to adults and 6 gm. fat per kg. body weight in a 7-week old infant. Infusion periods ranged from 3 to 27 consecutive days. That the emulsion was effective was indicated by favourable clinical response, the prevention of weight loss, and the maintenance of positive nitrogen and potassium balance. Subsequent postmortem examinations of three of these patients revealed that the fat emulsion had produced no pathological changes, gross or microscopic.

---

* Gorens, S. W., Geyer, R. P., Matthews, L. W. and Stare, F. J.: *J. Lab. & Clin. Med.*, **34**: 1627, 1949.

Occasionally a temperature rise is seen following infusion of a fat emulsion. Insufficient evidence is available to indicate whether this rise in temperature is due to the amount of fat *per se* or to pyrogens contained in the fat, which, when they reach a certain concentration, give rise to the increase in temperature. At present, the latter seems to be the more likely cause. Emulsion 41 is still not considered as completely suitable for clinical use, because of the development of pyrogenicity after it is approximately 4 weeks old. If further research can remove this disagreeable feature, fat emulsions will be a useful adjunct to the solution of some nutritional problems requiring parenteral feeding.

Spontaneous Rupture of the Heart Following Acute Myocardial Infarction*

Cardiac rupture occurred in 8 patients of a series of 111 instances of acute myocardial infarction in patients who had been observed in the Evanston Hospital and came to autopsy during the past six years. Their ages ranged from 51 to 86 years, averaging 68, and they were equally divided in sex. Death occurred rapidly after the occurrence of the rupture, as evidenced by the condition of the pericardial sac and lacerated tissues. Four patients showed ante-mortem clotting of the blood in the pericardial sac and one had organization of the clot, but the remaining three revealed only bright, unclotted blood. Clinical observation indicated that three expired immediately after the rupture, four within a day, and only one survived sixty hours. All eight deaths occurred within 2 to 11 days, average 5.8 after the clinical onset of acute myocardial infarction. The rupture occurred in the left ventricle in seven of the patients, four posteriorly and three anteriorly, while the remaining one ruptured through the right ventricle and septum at the apex. Positive electrocardiographic evidence of acute myocardial infarction was present in all of the rupture group except one patient on whom such an examination was not possible because she expired within a half hour after admission to the hospital. The clinical diagnosis of rupture was made in six of the patients prior to autopsy. Rupture of the heart occurred in four of these patients during defecation.

* Turnbull, G. C. and others: *J. Lab. & Clin. Med.*, **34**: 1759, 1949.

There are men and classes of men that stand above the common herd; the soldier, the sailor, and the shepherd not infrequently; the artist rarely; rarelier still, the clergyman; the physician almost as a rule. He is the flower (such as it is) of our civilization.—Robert Louis Stevenson.

MEDICO-LEGAL

MEDICO-LEGAL COMMENTS*

PART II.

T. L. Fisher, M.D.

Ottawa, Ont.

The discussion of the next means of preventing suit or of successful defence will, of necessity, be just as incomplete but is of equal importance. From a legal point of view no other thing offers such protection as ordinarily good, adequate, office records. Again in parenthesis, nothing else will stimulate better work — and therefore lessen the chance of suit—than office records. Such records should include the findings on examination, that is, the history and physical examination; the conclusions drawn from these findings; the advice given as the result of them, that is, the proposed treatment; the treatment given; and, ideally, the result obtained should be stated, to guard against future claims of poor results or of results poorer than was the fact.

Some details about records will bear emphasis because experience has shown lack of them to be prolific causes of trouble. There is no reason why doctors should not state how many stitches were removed from a wound as well as, which is oftener the case, how many were put in. And such a note may save a suit from a false claim of an unnecessarily big scar because one stitch was forgotten. It is as easy to write "x stitches removed" as just "stitches removed" in the record and it may be a mighty comforting entry some day. X-rays of fractures are records. Be sure that such records include the result of treatment, that is, be sure there is a check x-ray after the treatment of all fractures. Then no patient can show a misplaced bone end and claim it resulted from the doctor's care. And don't think patients never do that. The patient who decides he has worn the cast long enough, takes it off, falls and refractures the bone and claims the ill-result was the doctor's is not by any means unknown. The commonest source of trouble here is the patient's desire to save money. The doctor commonly reduces the fracture under the fluoroscope, knows it is a good result, the patient asks that he be saved the costs of the check x-ray and out of the goodness of his heart the doctor consents, only to find himself at a later date on the receiving end of trouble said by the erstwhile grateful patient to have arisen because no check x-ray was taken which would have shown an imperfect result. Always and invariably have a check x-ray after the cast has hardened. Then, and only then, is the result known to be good and only with such evidence can the doctor demonstrate that he got a good result. This is so important that one further statement about it seems justified; more than one doctor has had his reputation, his life-

savings, his home, his insurance and some of his future earnings saved, because he had an x-ray to show that his work was good. Remember too that it is a most expensive business to maim a person. The person who claims a poor result from a fracture is, in effect, claiming that the doctor allowed him to be maimed and if he proves it, the cost is high.

One could go on almost interminably about records. The sponge count in the operating room is a record which may show later that the doctor did not leave a sponge where no sponge should be. Remember too, that if the hospital does not make a sponge count as a matter of routine—there are hospitals like that even today—you, as the surgeon in charge, have the right and the power to insist that during your operations a count shall be made, written down and the record kept. Similarly with packing. It is not being fussy for the surgeon to insist either that the packing be left for him to remove and that he note on the chart that he did remove it or that the intern who removes it must note it, date the note and sign it. A small piece of packing can cost a surgeon thousands, literally thousands, of dollars.

It is worth remembering too that most provincial laws, unfortunately often honoured in the breach, demand that there be a history and physical examination and a preoperative diagnosis noted on the chart of a patient before any surgery is done. Already doctors in Ontario have been sued, with the fact that no preoperative note had been made used to add weight to the complaint.

All these things properly done may help a doctor show that he possessed reasonable knowledge and used it with reasonable care and skill. Unrelated to them is another important cause of trouble, the frequent complaint that a doctor failed to maintain professional confidence. Before dealing with that it may be worthwhile to enumerate a few instances in which information gained from a patient may be imparted to someone else. It is necessary that a consultant be told whatever history is relevant; there are times when nurses must be told some of the facts if they are to nurse patients properly; it is now accepted that information from patients' charts may be used for scientific purposes, omitting names and other identifying details whenever possible. Usually the information about a husband or wife may be given to the other. When the patient is accompanied into the consulting room by the husband or wife, permission to divulge information may be presumed. Similarly with a parent and child, if the patient does not object to the other's presence permission to talk before the relative may be assumed. Unless the doctor has some knowledge of the family, however, it is always wise to assume that information may not be divulged; there are times when a husband or wife, or a parent or a child may wish information to be private and no explanation after the talking has been done can undo the breach of confidence.

Under other circumstances patients have the right to expect doctors to maintain confidence, to refuse discussion of their cases with anyone. What is more they may claim damages with every hope of collecting them, if doctors talk. Particular care needs to be taken about some things that are becoming increasingly frequent. Many firms, that is to say, employers, demand a medical examination of applicants for work and regular examinations of their employees. In such cases the employers usually pay the doctor. On the basis of the doctor's reports decisions are reached as to the employability of the applicants and the continued employability of the others. Confidence about the results of these examinations must be maintained just as elsewhere. The doctor should know the work it is proposed the applicant will do and should report merely that, as a result of his findings, he deems the individual physically fit or unfit for employment. The firm, the employer, that is, should have chosen the doctor carefully enough that the simple statement is enough. Ideally, the actual findings should remain in the doctor's files and not in the employer's. If, as is commonly the case, the employer deems that as he is paying the doctor, he is entitled to the results of the examinations it should be made clear to him that he is wrong. If then it is insisted that the findings must go to the employer, either of two courses may be followed. The findings, with the clear statement that they are the result of the examination which the employer wants, may be handed to the employee to take to the employer. If the employee delivers them it may be presumed he wanted the employer to have them. Or a form of permission may be a detachable part of every physical examination form. After a clear explanation that it is permission to transmit the findings to the employer, the employee should be asked to sign it and if he does, it may be detached and kept in the doctor's files while the report of the examination is sent on. An employee, whether he be one of a hundred thousand in a large firm or the maid of a fussy housewife, has a right to expect that the doctor will respect professional confidence irrespective of who is paying the bill.

Insurance companies frequently request information about patients. Not too uncommonly such information reacts to what the patient feels is his disadvantage, and he may make inquiries as to the authority by which the doctor divulged the information. Most application forms for insurance include permission for information of this kind to be obtained from the doctors. Be sure the company, with its request for information, sends along the signed permission or a photostat copy of it.

Never, under any circumstances, divulge information without it, whether the patient be alive or dead; if dead, his estate may claim from you.

There is one outstanding exception to all these remarks about maintaining professional confidence, an exception about which many doctors seem to be wholly ignorant. When a doctor is in the witness box in a court of law he has no privilege and may not refuse to answer questions about his patients. It is considered that the ends of justice are more important than the confidence between a doctor and a patient. When the court asks questions the doctor must answer. Such answers can not be construed as a breach of professional confidence and no action can be brought against the doctor later because of them. This, equally certainly, is not true of requests for information from some lawyers before trials. Then confidence must be maintained. Lawyers sometimes let doctors infer that the fact the information is to be used in court later will protect them; it will not and the patient's permission is necessary before divulging any facts.

This perhaps brings us to the point where we may discuss what to do when trouble is threatened or has actually begun. The first and best advice is to avoid as one would the devil the two extremes of action. Neither frighten so easily that a lot of foolish statements, implied promises or promises are made; nor bluster so much that the impression is given that there is something to conceal. A patient who is complaining or threatening is entitled to one, and one only, concise, clear statement of the facts of the case together with the statement, if it be true, that the doctor did the best of which he was capable and therefore will accept no responsibility for the alleged ill-result. After that one fair, concise statement refuse all discussion, verbal or written, with the patient, the patient's relatives or the patient's lawyer. If the patient is threatening in the hope that the doctor can be frightened into waiving his fee or paying the patient some money, the fact that discussion is refused will bring the matter to an earlier end than anything else. If, on the other hand, the patient has decided to take action against the doctor nothing that is said will change his mind and the doctor, by talking, merely runs the risk of saying something that may be misinterpreted and used against him later on. Remember that when they are discussing what they think is a poor result patients who have been friends are not friends any longer and only maintain the pretense to extract some statement which will bolster their argument later on. It is literally true that more doctors talk themselves into than talk themselves out of trouble. Many is the poor doctor who was so anxious to explain something that the patient had not recognized as an unusual result that he planted the idea of the subsequent action. Be fair, but be concise about it.

And if you have insurance or membership in a mutual defence society carefully refrain from mentioning it. Too many doctors think they can scare off a determined patient by telling what good defence they will have by their supporting organization when, in fact, all they do is to put another and very potent weapon in the patient's and lawyer's hands. Quite often when patients think they are suing the doctor alone they have grave doubts about the doctor's ability to pay anything they win and they tend not to sue. But let them or their lawyer learn that an organization may be behind the doctor and they quickly realize that anything they win they can collect and they proceed merrily on their way knowing it is a risk well taken. Act as though the matter were on your own shoulders alone but get advice from the protecting organization at the first hint of trouble and act on it carefully.

Doctors would not frighten quite so easily if they kept one fact in mind. The law does demand that a doctor have reasonable knowledge and use it with reasonable care and skill, but it does not demand that all results be good. Patients quite often decide that an unavoidably bad result is the doctor's fault. The doctor should have sense enough to recognize the cases where accidents were, actually, unavoidable and the cases where no doctor, no matter how skilful, could have obtained a good result. Such realization would enable the one concise, fair explanation to the patient to be factual and forceful enough to ward off legal trouble. Never accept blame for something that could not have been prevented.

One rather amusing example comes to mind. Some years ago a doctor in a city did a tonsillectomy on a patient from the hinterland and because she was so far from medical advice she was kept in hospital for five or six days after the operation. A week after she was allowed home she returned to the doctor, her jaw obviously dislocated, with the complaint that the dislocation occurred during the tonsillectomy. The doctor, badly scared, agreed and arranged to pay for the necessary x-rays for diagnosis and anæsthetist and surgeon and operating room for reduction. Then he sought help from his defence organization, to whom it seemed that such a thing just could not happen; no doctor could see a patient daily in hospital for five days without recognizing a dislocated jaw if it were present. It was suggested to the doctor that he come down to earth, get more information and begin to look after himself. Then he learned that the jaw had been dislocated during an especially hearty laugh a week after the patient got home and that she thought the accusation might get her free treatment—which it nearly did!

When threats are being made to the doctor he should never acquiesce in any suggestion, or intimate or promise, that he will assume any part of the costs caused by the alleged ill-

result. There are cases where doctors feel that if other things had been done or if those that were done had been done better a poor result might have been avoided. With that amount of self-blame they start paying a part or all of the patient's expenses. By so doing they put themselves into an impossible position, because sooner or later the patient decides the doctor would never have paid had the fault not been wholly his, a conclusion natural enough under the circumstances and one which almost invariably leads the patient to court to collect more. A defence for the doctor is difficult because the patient's argument is so plausible—that the doctor would not have paid anything had he not been at fault. Right from the beginning refuse to entertain any suggestion of payment in any form.

When trouble comes upon him the doctor should never consider settlement on the ground that the adverse publicity will do him irrepparable harm. It will not. Granted there has not been gross carelessness he can depend on people taking one of two stands. Those that dislike him will regard his trouble as confirmation of their opinion and no harm is done. Those who are his patients and like him will be equally sure he is right, will admire him for defending himself and tend to rally round and support him. The loyalty of patients often comes as a great surprise, is very helpful, and should never be underestimated.

Finally, remember it may just as well be the first as the thousand and first patient who decides to sue, so ensure some assistance before seeing the first patient. The Canadian Medical Protective Association knows the cost of defending doctors successfully, and knows that the average doctor could not afford to defend himself let alone pay damages, and it has seen more than one doctor who had no assistance ruined financially. The last one of which it had detailed knowledge forfeited, for an accident that could happen to any doctor, his savings, his home, his insurance, and his private hospital, all because he failed to ensure help should he need it. If the choice be malpractice insurance, remember that every unnecessary claim settled fathers two or three bigger and better claims while every action fairly defended in the courts of the land discourages two or three more, and take the insurance out only with a company that has demonstrated its willingness to defend its policy-holders instead of settling claims against them. Still better, in countries where they exist, as they do in Canada and in Great Britain, join a mutual medical defence society. Its only reason for existence is to provide assistance to its doctor-members, assistance which will be most effective for and advantageous to the individual doctor and the profession as a whole.

ASSOCIATION NOTES

THE ANNUAL MEETING

Have you made your reservation yet? Time is passing! The days are growing longer and spring will be here before you know it.

Some people have wondered what sort of accommodation the Halifax folk have in mind for delegates to the Annual Meeting after the limited hotel accommodation is allocated. Well, with the experience of the Halifax Bicentennial year in 1949 to draw upon, we feel we have the answer: First of all, on the highways approaching the city are several groups of first class tourist cabins, comfortable, and so near the city that either by car or by bus, the distance from the Nova Scotian Hotel, Headquarters of the Meeting, is not an inconvenient factor. In these cabins you can be comfortable and many of them are located in quiet and beautiful spots overlooking the salt water. Then there are tourist homes. These are comfortable, well furnished and hospitable. All have been and will be inspected. There are smaller hotels too and private homes, glad of a paying guest or two for a few days. All of these are being sought as sources of your care and entertainment. Shirreff Hall, the beautiful women's residence of Dalhousie University is being reserved for the Medical Women's Branch. Of one thing you can be sure, you need not hesitate about coming to the Annual Meeting at Halifax because accommodation will be inadequate.

To many physicians the Annual Meeting is their Annual Holiday. If this is so in your case, let me make a suggestion: Why not remain in Nova Scotia for a week or two after the meeting. The tourist season does not really "break" until July 1. The highways will be quiet, and the beautiful country at its very best. You can cruise about or make your headquarters at one of the many fine hostels and take short trips in several directions or just rest as the mood strikes you. The by-roads of Nova Scotia are a source of joy to the visitor. There one finds the best scenery, the finest native hospitality, and the very essence of peace. The Nova Scotia Tourist Bureau, Provincial Building, Halifax, has invited your inquiries, and its staff will take a special interest in assisting any physician who writes to secure the type of accommodation he wishes.

I hear little whispers here and there about the program, and it sounds very good to me. It will be informative and stimulating. Our big neighbour to the south is about to grapple with the problem of Nationalized Medicine. Sooner or later Canada must deal with the same issue. Every physician in our land should inform himself of what has happened where this great experiment is being tried. Has the people's prescription for itself worked? No article

about any single country gives the entire story. Join the group at Halifax in June where all sides of the question will be reviewed.

Finally, if you have not done so, write to Charlie Jones, (Dr. C. M. Jones, Halifax Infirmary, Halifax, Nova Scotia), about your reservation. He will have enough white hairs as it is before this meeting is over, and quick action on your part may save him a few.

H. L. SCAMMELL

Dalhousie University,
February 4, 1950.

Physicians' Art Salon Moves to Halifax

The 1950 Physicians' Art Salon sponsored again by Frank W. Horner Limited, will appear for the 6th year at the Nova Scotian Hotel in Halifax. The salon will run from June 19 to 23, coinciding with the Canadian Medical Association annual meeting. The 1950 salon will retain essentially the same structure as in the past, but a few modifications have been made affecting previous first-prize winners and undergraduates.

Palette Club formed.—The salon committee announced that a Palette Club has been formed, composed of all previous first-prize winners in the three classes. Palette Club members will be withdrawn from the general competition and will be allowed to compete for special prizes in their own group. This move is made to eliminate the dominance of same artists from year to year.

Undergraduate panel absorbed. — The salon committee has decided to permit all undergraduates to compete on the same basis as graduate doctors. This means elimination of a special undergraduate panel and opening the general competition to all entrants.

Salon structure.—The Physicians' Art Salon is composed of three sections: fine art, monochrome photography and colour photography. Exhibitors may contribute up to four entries in fine art and monochrome and up to six colour transparencies. All work is judged by a panel of outstanding critics for prizes and awards of merit.

All physicians and undergraduates who wish to exhibit work in the 1950 Physicians' Art Salon are asked to write Frank W. Horner Limited, salon sponsor, 950 St. Urbain Street, Montreal, Que.

Kentville and the Cornwallis Inn. An ideal spot for a holiday in Nova Scotia's Annapolis Valley — the "Land of Evangeline".

INCOME TAX INFORMATION

Individuals whose income — (*a*) is derived from carrying on a business or profession (other than farming); (*b*) is derived from investments; or (*c*) is more than 25% derived from sources other than salary or wages, are required to pay their estimated tax by quarterly instalments during such year. Each payment must be sent in with Instalment Remittance Form T.7 - B Individuals. Any balance of tax is payable with interest with the T - 1 General return which is due to be filed on or before April 30 of the succeeding year.

The following timetable indicates the returns required:

A. Doctors NOT receiving salaries amounting to ¾ of income:

Date due	Forms to be used
March 31	T.7 - B Individuals.
April 30	T.1 - General. (NOTE: Only doctors deriving their full professional income from salaries may use Form T.1 Short.)
June 30	T.7 - B Individuals.
September 30	T.7 - B Individuals.
December 31	T.7 - B Individuals.

B. Doctors receiving salaries amounting to ¾ or more of income:

Date due	Forms to be used
April 30	T.1 - General (NOTE: Only doctors deriving their full professional income from salaries may use Form T.1 Short.)

T.D. - 1 at commencement of employment or when there is a change in status affecting personal exemptions.

Doctors who pay salaries to their own employees are required to send in Form T. - 4 by the end of February each year.

For income tax purposes the salary received by a doctor is net. Therefore doctors must pay tax on the total amount they receive as salary. Doctors are urged to arrange with their employers that such items as automobile expenses and medical association fees, be paid by the employer as an item of expense and not included in salary.

DOMINION INCOME TAX RETURNS BY MEMBERS OF THE MEDICAL PROFESSION

As a matter of guidance to the medical profession and to bring about a greater uniformity in the data to be furnished to the Income Tax Division of the Department of National Revenue in the annual Income Tax Returns to be filed, the following matters are set out:

Income.—(1) There should be maintained by the doctor an accurate record of income received, both as fees from his profession and by way of investment income. The record should be clear and capable of being readily checked against the return filed. It may be maintained on cards or in books kept for the purpose.

Expenses. — (2) Under the heading of expenses the following accounts should be maintained and records supported by vouchers kept available for checking purposes:

(*a*) Medical, surgical and like supplies.

(*b*) Office help, nurse, maid and bookkeeper, laundry and malpractice insurance premiums. (It is to be noted that the Income Tax Act does not allow as a deduction a salary paid by a husband to a wife or vice versa. Such amount, if paid, is to be added back to the income.)

(*c*) Telephone expenses.

(*d*) Assistants' fees.—The names and addresses of the assistants to whom fees are paid should be furnished. This information is to be given each year on Income Tax form known as Form T. - 4, obtainable from your District Income Tax Office.

(*e*) Rentals paid.—The name and address of the owner (preferably) or agent of the rented premises should be furnished (see (i)).

(*f*) Postage and stationery.

(*g*) Depreciation.—Effective with the taxation year 1949, a very significant change has been made with respect to the method of computing annual depreciation charges on capital equipment. This new method is termed Capital Cost Allowance and is outlined in P.C.6385, dated December 21, 1949. All previous information published to the profession pertaining to depreciation on both medical equipment and motor cars and on residences used for both dwelling and office purposes should be disregarded.

For the first time, definite rates of depreciation applicable to various kinds of capital assets have been defined. These rates are grouped by classes. The physician will find the following examples helpful as a first step in computing the annual depreciation on his equipment or other capital items:

Capital item	*Class*	*Annual maximum depreciation*
Medical equipment, including electrical apparatus		
(*a*) Instruments costing over $50 each and medical apparatus of every type	8	20%
(*b*) Instruments under $50 each	12	100%
Office furniture and equipment	8	20%
Motor car	10	30%
Building (Residence used both as dwelling and office)	3	5%

Replacing the previous method of charging off depreciation rateably over the estimated life of the asset, the above rates are applied as a percentage of the diminishing value each year.

An instrument acquired at a cost of $100 will be treated as follows:

Original cost	$100.00
Depreciation 1st year—20%	20.00
Diminished value end of 1st year	80.00
Depreciation 2nd year—20%	16.00
Diminished value end of 2nd year	64.00
Depreciation 3rd year—20%	12.80
Diminished value end of 3rd year	51.20

(Continued until asset reduced to negligible amount.)

The same procedure is applicable to the items of each class mentioned above by applying the correct percentage rate applicable.

To establish the present value of items acquired before the institution of the system of Capital Cost Allowance, the physician should deduct from the original cost the amount of depreciation already claimed.

Reference is made to T.-1 General 1949, Part 4 of which sets forth the procedure to be followed. The relevant schedule is reproduced:

Column (1) Class number or kind of asset	(2) Original cost (excluding land)	(3) Total depreciation accumulated for tax purposes in prior years	(4) Undepreciated cost at beginning of year (Col. 2 less Col. 3)	(5) Cost of additions during year	(6) Proceeds from disposals during year	(7) Undepreciated capital cost before 1949 allowance (Col. 4 plus 5 less 6)	(8) Rate %	(9) Capital cost allowance
A motor car purchased in 1947 for $2,500 and still on hand at end of 1949:								
10	$2,500	$1,000	$1,500	....	....	$1,500	30%	$450
A motor car purchased in 1947 for $2,500, sold in 1949 for $1,500, and replaced by the purchase of a new car:								
10	$2,500	$1,000	$1,500	$2,500	$1,500	$2,500	30%	$750

If the dollar amount of the depreciation allowance in respect of the 1949 taxation year under the new regulation is less than the allowance that would have been made under the 1948 law and practice, a doctor is permitted to deduct the dollar amount of depreciation for the 1949 taxation year equivalent to the amount which would have been permitted under the 1948 law and practice rather than under the new regulation.

When a doctor uses part of his dwelling as an office, the office premises now take a separate cost for depreciation purposes. Where one-third of the total space is occupied as office and waiting-room, the professional quarters in a $12,000 house is deemed to have a cost of $4,000. Where a doctor increases his office space in his home, he should consult his local Income Tax Office to determine the basis for depreciation.

(*h*) *Automobile expense; (one car).* — This account will include cost of license, oil, gasoline, grease, insurance, garage charges and repairs. The capital cost allowance is restricted to the car used in professional practice and does not apply to cars for personal use. Only that portion of the total automobile expense incurred in earning the income from the practice may be claimed as an expense and therefore the total expense must be reduced by the portion applicable to your personal use.*

(*i*) Proportional expenses of doctors practising from their residence: (*a*) Owned by the doctor. Where a doctor practises from a house which he owns and as well resides in, a proportionate allowance of house expenses will be given for the study, laboratory, office and waiting room space, on the basis that this space bears to the total space of the residence. The charges cover taxes, light, heat, insurance, repairs, capital cost allowance, and interest on mortgage (name and address of mortgagee to be stated);

(*b*) Rented by the doctor. The rent will be apportioned inasmuch as the owner of the premises takes care of all other expenses.

The above allowances will not exceed one-third of the total house expenses or rental unless it can be shown that a greater allowance should be made for professional purposes.

(*j*) Sundry expenses (not otherwise classified).—The expenses charged to this account should be capable of analysis and supported by records.

Claims for donations paid to charitable organizations will be allowed up to 10% of the net income upon submission of receipts to your Income Tax Office. This is provided for in the Act.

The annual dues paid to governing bodies under which authority to practice is issued and membership association fees, to be recorded on the return, will be admitted as a charge. Registration fees for license to practice or other registration or entry fees, and the cost of attending postgraduate courses will not be allowed.

(*k*) *Carrying charges.*—The charges for interest paid on money borrowed against security may only be charged against the income from investments and not against professional income.

(*l*) Business tax will be allowed as an expense, but Dominion, Provincial or Municipal income tax will not be allowed.

* **The alternative method of claiming deductions for the operation of a motor car in practice at a rate of 7 cents per mile is no longer applicable. Physicians must maintain a record of actual operating expense. The mileage rate may be used by the Department only in those cases where it is not possible to determine the actual car expense applicable to the practice.**

CONVENTION EXPENSES

"Effective January 1, 1948, the reasonable expenses incurred by members of the medical profession in attending the following Medical Conventions will be admitted for Income Tax purposes against income from professional fees:

1. One Convention per year of the Canadian Medical Association.

2. One Convention per year of either a Provincial Medical Association or a Provincial Division of the Canadian Medical Association.

3. One Convention per year of a Medical Society or Association of Specialists in Canada or the United States of America.

The expenses to be allowed must be reasonable and must be properly substantiated; *e.g.*, the taxpayer should show (1) dates of the Convention; (2) the number of days present, with proof of claim supported by a certificate of attendance issued by the organization sponsoring the meetings; (3) the expenses incurred, segregating between (*a*) transportation expenses, (*b*) meals and (*c*) hotel expenses, for which vouchers should be obtained and kept available for inspection.

None of the above expenses will be allowed against income received by way of salary since such deductions are expressly disallowed by statute.''

PROFESSIONAL MEN UNDER SALARY CONTRACT

3. Under the provisions of The Income Tax Act the salary paid to a doctor is taxable in full without any allowance for the deduction of automobile expenses, annual medical dues or other expenses. The employees' annual contribution to an approved Pension Plan and alimony payments, however, may be deducted from salary.

REDUCED FARES FOR RAIL TRAVEL TO THE ANNUAL MEETING

The Canadian Passenger Association has authorized special convention rates for members of the Canadian Medical Association and their families travelling by rail to the annual meeting in Halifax. Identification certificates permitting members to purchase tickets at a considerable saving may be obtained on application to the General Secretary, Canadian Medical Association, 135 St. Clair Avenue West, Toronto 5, Ontario.

DATES OF SALE

From points in Eastern Canada (that is Fort William, Armstrong, Ontario, and east thereof) —June 13 to 22, inclusive; except that, from points in Newfoundland, they will be June 12 to 21, inclusive.

From points in Western Canada, round trip tickets will be issued as follows:

From British Columbia, June 8 to 17, inclusive.

From Alberta, June 9 to 18, inclusive.

From Saskatchewan, June 10 to 19, inclusive.

From Manitoba and Ontario (West of Fort William and Armstrong, Ont.), June 11 to 20, inclusive.

FARE BASIS (ADULT)

1. Going and returning same route—one and one-half times the adult normal one-way first-class or coach-class fare applying via route used, as shown in tariffs, plus 25 cents.

2. Diverse routes.—Three-quarters of the one-way first-class or coach-class fare, as the case may be, applying from starting point to destination via route travelled on going trip, plus three-quarters of the one-way fare of the same class applying from starting point to destination via route travelled on return trip, plus 25 cents.

RETURN LIMIT

Thirty days in addition to date of sale.

THE CAMSI COLUMN

Doctors' Apprentices

Alert to the increasing incentive to specialize, CAMSI (The Canadian Association of Medical Students and Interns) has gone on record as favouring the principle of stimulating greater interest in the general practice of medicine.

It believes this to be a matter of education, more especially a broader and more intimate knowledge of the function, need, and value of the general practitioner in a community. Accordingly, a plan has been devised by which, through the active co-operation of practitioners in all parts of Canada, this education may be brought to medical students: doctors engaged in general practice are urged to accept a clinical year student as an apprentice during the coming summer months.

Write to the undersigned, giving name, address and special qualifications of the student if desired. This information will be presented to the students of Canada's medical schools, who will apply personally to such names received. Mr. Guy Lemieux, N.D.P.R., CAMSI National Executive, Room B'211, University of Montreal, 2900 Mount Royal Boulevard, Montreal 26, Que.

MEDICAL SOCIETIES

Canadian Urological Association

The annual meeting of this society will be held in Toronto on Friday and Saturday, April 28 and 29, instead of the 24th and 25th as previously announced. The policy inaugurated last year of having part of the program devoted to the basic sciences, as applied to urology, will be followed.

The association now has a membership of 105, and a very large attendance at this second annual independent meeting is anticipated. An active social program for the wives of members and guests is being arranged.—S. A. MacDonald, Secretary.

Quebec Division of the C.M.A.

The Quebec Division of the Canadian Medical Association held a dinner meeting on the evening of January 26, at which the question of socialized medicine was discussed, particular reference being made to prepaid medical care plans. Dr. Jean Saucier, President of the Quebec Division, was in the chair. The meeting grew out of the feeling that the Quebec Division was not in full accord with the aims of the parent body in its decision to apply for a Dominion charter covering prepaid medical care plans. The Division agreed to the principle of these plans but it was felt that they should aim at covering hospitalization costs only, rather than over-all medical care. It was with the idea of obtaining the views of the Quebec members at large that this meeting was held. Dr. Vance Ward opened the proceedings with a brief comment on the attitude of the profession towards governmental direction of medicine in general. He pointed out that there were four ways in which we might deal with the question.

(*a*) By direct opposition.

(*b*) By making no effort to deal with the problem.

(*c*) By a *laisser-faire* attitude on the part of the older members in the hope that developments would be so gradual as not to affect them within their active period.

(*d*) By suggesting solutions based on prepaid medical care plans.

The first method had never been of any use. The history of such efforts in Great Britain had clearly demonstrated this. If, in the next place, however, no effort at all was made to deal with the problem, we would be threatened with the spectre of state medicine. The third alternative he did not seriously think was likely to be operative. We were left then with the proposal to develop prepaid medical care plans to solve the problem of the cost of medical care. However, even this solution was by no means a simple one. In general, it could be said that the great need today is for insurance against costs arising chiefly from hospitalization expenses rather than the small occasional office and house calls and minor illnesses. Figures were produced to show that the cost of hospitalization was considerably greater than the costs for office and general treatment outside of the hospitals.

With this in view, the proposal was made that prepaid medical care plans might be developed to deal with the cost of severe illness for a large proportion of the population. Those unable to participate should be subsidized by the Government.

An important distinction was made, however, between the type of prepaid medical care plan which covered only hospitalization costs and associated medical fees, and plans which attempted to provide for complete costs of medical care both in and out of the hospital. The second speaker of the evening, who was the representative of the Quebec Hospital Service Association, explained why their association dealt only with hospitalization costs rather than the over-all medical care, on the grounds of cost. The over-all medical care plans were bound to be much more expensive than those dealing only with hospitalization costs. This matter of increased cost for increased coverage came up again and again in answer to various questions as to the working of the Quebec Hospital Service plans. There is no question that medical care if it is to be good *and* complete, is bound to be expensive.

The general feeling of the meeting, as expressed in a final motion, was that more time should be devoted to the study of prepaid medical care plans before selecting the type to be put forward as the solution of the cost of medical care.

Winnipeg Medical Society

The December meeting of the Winnipeg Medical Society was addressed by Sir Heneage Ogilvie, Surgeon to Guy's Hospital, London, and editor of Recent Advances in Surgery. He was introduced by Dr. F. A. B. Sheppard, formerly Professor of Surgery, Madras University, now a member of the Winnipeg Clinic. Sir Heneage gave a review of peptic ulcer with a plea for gastrectomy. In the discussion which followed Dr. K. R. Trueman championed the cause of vagotomy. On the following afternoon, December 17, Dr. P. H. T. Thorlakson gave a reception at the Manitoba Club for the distinguished visitor.

ROSS MITCHELL

Regina and District Medical Society

The Regina and District Medical Society held a dinner meeting on Tuesday, January 17 at the Hotel Saskatchewan. At the election of officers Dr. J. D. Anderson was elected President, Dr. G. R. Walton, Vice-president and Dr. F. C. Dobie, Secretary and Dr. J. C. Armit, Treasurer. The Board of Directors included Dr. G. M. Malone, Dr. G. C. Bradley, Dr. D. G. McKerracher and Dr. L. Cowan. Owing to the illness of Dr. C. R. May, immediate Past President, Dr. J. D. Anderson took the Chair. The scientific session of the Society was held the day before when Dr. Duncan Graham gave a talk on Venous Thrombosis.

Prince Albert and District Medical Society

A meeting of the Prince Albert and District Medical Society was held early in January at which Dr. D. A. Stewart of Saskatoon gave an interesting talk on Pædiatrics. Election of officers for 1950 was held at which Dr. D. V. Chipperfield was elected President; Dr. M. P. Barry, 1st Vice-president and Dr. J. B. Legault, 2nd Vice-president. Dr. D. P. Miller, now residing at Victoria, B.C. was elected Honorary President. Dr. D. B. Swartout was elected Secretary and the Local Executive include Dr. G. R. Dyker and Dr. W. R. Swaffield.

Saskatoon and District Medical Society

A dinner meeting of the Saskatoon and District Medical Society was held at the Bessborough Hotel on Wednesday, January 25. Guests at the meeting were Dr. Duncan Graham of Toronto and Dr. Kinsman of Ottawa. The guest speaker, Dr. Graham, was introduced by Dr. J. F. C. Anderson and gave a talk on "Venous Thrombosis".

G. G. FERGUSON

Montreal Obstetrical and Gynæcological Society

The Montreal Obstetrical and Gynæcological Society held its second scientific meeting and dinner on February 2. Dr. A. D. Campbell, President and chief organizer of the Society, was in the chair, and introduced the guest speaker of the evening, Dr. Emil Novak, of Baltimore. Dr. Novak's address was on "Functioning Ovarian Tumours" and speaking with the ease and clarity of a master, as well as from an unrivalled experience, he made a difficult subject seem simple.

NOTES ON GENERAL PRACTICE

[*This column will be devoted to points concerned with general practice. Questions are welcomed. They will be answered by well qualified men. Other short contributions or notes on general practice will also be welcome. General practitioners are particularly invited to make use of the column. All communications should be signed, but the writer's name will be omitted on request.*—EDITOR.]

Q. I have a patient with progressive muscular atrophy involving chiefly the lower limbs. The rest of the body shares in the atrophy, but I think the latter is due to disuse. I have tried many things to help this patient, without success. Is there anything new that may be suggested? J.E.M.

A. The treatment of this condition is still most unsatisfactory. It is an atrophy of the muscles which is secondary to degeneration of the anterior horn cells, and is closely related to amyotrophic lateral sclerosis and progressive bulbar palsy. These conditions are probably all the same disease, but different parts of the nervous system. As yet the etiology is not known, and as a result the treatment is unsatisfactory. Many things have been tried, including vitamin E, cytochrome C, vitamin B, etc., without any real success. Frequently physiotherapy temporarily helps the patient, but eventually the progress is downhill. The greatest hope lies in finding that the patient does not suffer from progressive muscular atrophy, or amyotrophic lateral sclerosis, but has some lesion compressing the cord that is amenable to surgery.

CANADIAN ARMED FORCES

News of the Medical Services

With the holding of the annual meeting of the Canadian Medical Association this year in Halifax a unique opportunity is presented to all former Naval Medical Officers to hold their first national reunion. Many yarns would be spun of the days and nights on the bounding main; "Ad House" would recall the thrill of a spell ashore; and the hospital would remind of "the cares which infest the day". You would all like to see Halifax again and note that most of the pot holes in the streets had been filled, that the Toonerville trolleys have given way to streamlined buses and that paint is something people put on houses.

To organize clam bakes on the shore, lobster boils on McNab's, or the odd "do" aboard ship, it would be an advantage to obtain a fair idea of the numbers (including family) to be expected. So plan for a trip down East and inform the Medical Director General at Naval Headquarters, Ottawa, of your intentions. It might even be possible to arrange service accommodation for a limited number of those who are unaccompanied.

The following Army medical officers attended the course on the Medical Aspects of Atomic Warfare, held at the Army Medical Centre , Washington, D.C. February 6 to 13, 1950.

Active Force: Lieut.-Col. A. F. Nancekivell, Toronto, Ontario; Major J. R. Feindel, St. John's, Newfoundland; Major R. Feuiltault, Quebec, P.Q.; Major J. S. Hitsman, London, Ontario; Captain Y. J. Leclaire, Montreal, P.Q.

Reserve Force: Major W. J. Downs, Edmonton, Alberta; Captain C. W. Donnelly, Vancouver, B.C.; Lieut.-Col. J. D. McIntosh, Fort William, Ont.; Major J. S. Kobrinsky, Winnipeg, Manitoba; Major G. C. Ferguson, Port Arthur, Ontario; Col. R. A. Gordon, Toronto, Ontario; Lieut.-Col. G. E. Wilson, Kitchener, Ontario; Col. C. U. Letourneau, Montreal, P.Q.; Major R. J. Brown, Moncton, New Brunswick.

Brigadier W. L. Coke and Lieut.-Col. J. S. McCannel of the Directorate of Medical Services (Army) attended the regular meeting of the Defence Medical Association in Montreal January 30, 1950, at which Major-General F. F. Worthington, Co-ordinator of Civil Defence, addressed the gathering on the subject of Civil Defence Organization. Following General Worthington's address Colonel McCannel who has recently returned to this country from the United Kingdom where he participated in an exercise devoted to the study of the problem spoke on the subject of "Medical Aspects of Civil Defence".

In the past month liaison visits have been made to the Institute of Aviation Medicine, Royal Canadian Air Force, by medical representatives of other countries including Lieut. R. J. Covas of the Cuban Government and Lieut.-Col. Arne Frykholm of the Royal Swedish Air Force, who, as well as being a Medical Officer is an outstanding pilot in his country. Also visiting are two members of the Royal Netherlands Air Force.

Wing Commander L. M. Crooks of the Royal Air Force Medical Branch arrived in Canada for a short period of attachment at the Institute of Aviation Medicine. Both his training and his work with the Royal Air Force are in the field of neurovascular surgery.

The tenth meeting of the Advisory Medical Committee to the R.C.A.F. was held in Ottawa, January 14 and 15. This group, comprising eleven civilian specialists meet in Committee to advise the R.C.A.F. Medical Branch on matters of policy in general and in particular in their own specialty fields.

The R.C.A.F. medical responsibilities in Operation "Sweetbriar" are under the direction of Wing Commander H. J. Bright, Staff Officer of Health Services, North West Air Command, Edmonton. The medical details of the Operation, including air evacuation, etc., are being carried out in co-ordination with the appropriate Staff Medical Officer of the United States Service and of the Canadian Army.

SPECIAL CORRESPONDENCE

The London Letter

(From our own correspondent)

"WASTEFUL" PRESCRIBING

On the recommendation of a special committee, consisting of members suggested by the three Royal Colleges, the Scottish Medical Corporations, the British Medical Association, the British Pharmacopœia Commission and the Society of Apothecaries, a letter has been sent to all doctors "asking for their co-operation in the prevention of wasteful prescribing". The letter, which is signed by Sir Wilson Jameson, chief medical officer of the Ministry of Health, states that this committee considered that "much unnecessary cost was due to the prescribing of proprietary brands—particularly those which are widely advertised—instead of standard drugs". "Standard drugs", which are defined as those of the British Pharmacopœia, the British Pharmaceutical Codex and the National Formulary, "can be ordered just as effectively and at much less expense by their official titles". Attention is also drawn to the fact that, whilst "a doctor is free to prescribe whatever drug he considers necessary, the Regulations provide that action may be taken by the Minister where "investigation shows that the cost is in excess of what was reasonably necessary for proper treatment".

This is the first definite step in the campaign which is now opening to reduce "the large sums of money [which] are being spent on drugs and medicines of doubtful value or on unnecessarily expensive brands of standard drugs prescribed in the National Health Service". The results will be anxiously watched by the three main interested parties: the Treasury, the pharmaceutical manufacturers and the doctors.

POLIOMYELITIS

Although corrected figures are not yet available, it is now possible to estimate with fair accuracy the extent of the poliomyelitis epidemic last year. These estimates show that the 1949 epidemic has only once been exceeded in severity—by the 1947 epidemic. The incidence in 1949 was 13 per 100,000, and the death rate was 14 per million. The corresponding figures for 1947 were 18 per 100,000, and 16 per million. The magnitude of the increase in incidence compared with pre-war years is strikingly brought out by the figures for 1938, the year with the highest recorded incidence prior to 1947. The notifications in 1938 were 4 per 100,000, and the deaths were 6 per million. As in 1947, distribution in 1949 was widespread, but in contrast with 1947, incidence was relatively high in the south-west and relatively low in the north-east.

AGENIZED BREAD

A committee consisting of representatives of the Ministries of Health and Food, the Medical Research Council and the milling industry has just issued its report recommending that the use of nitrogen trichloride (agene) should be discontinued in the treatment of flour. No evidence has been obtained that agenized flour has a toxic effect on man, but the committee is impressed by the evidence in favour of its deleterious effect on animals. The committee is satisfied that some form of "improver" is necessary to produce an acceptable loaf, and as a substitute for agene it recommends chlorine dioxide which in a concentration of less than 30 parts per million has been shown to be a satisfactory improver and to be non-toxic to animals and man. This

substitution, which has been approved by the two Ministries concerned and by the milling industry, will be effected gradually. One of the difficulties is that the necessary plant and supplies of the new improver have to be obtained from the United States. So ends an interesting nutritional experiment—like so many human experiments, inconclusively. On the other hand there is general agreement that in view of the experimental animal work, agene should be relegated to the laboratory and banned from the flour mill.

GERMS IN THE UNDERGROUND

Londoners are feeling more reassured since the publication of a report on "bacterial contamination of air in underground trains" which has just been published in *The Lancet*. Sampling was done during the rush hour when anything up to 110 individuals may pack themselves into one car. The highest general bacterial count obtained in any one-minute period was 170 colonies per cubic foot, whilst the average for the two routes sampled was 47 and 32 colonies per cubic foot. The streptococcal counts were also low: 0.33 and 0.22 per cubic foot. The other interesting observations were that, whilst the count rose steeply when passengers entered the car, it settled rapidly even while the car was full, and a small entry of passengers, *e.g.*, 20, caused as great a rise as did the entry of 50 to 100 people. When it is recalled that the same observers have obtained a mean count of 80 to 100 colonies per cubic foot in elementary school classrooms, the results in the underground trains are surprisingly, though comfortingly, low. As the authors point out, there can be "little risk of any persistent contamination of the air with pathogenic bacteria. . . . There must nevertheless still be a risk of transfer of respiratory infection, between passengers crowded together, by the more direct routes—by mouth droplets . . . and by particles from handkerchiefs." WILLIAM A. R. THOMSON

London, February, 1950.

ABSTRACTS FROM CURRENT LITERATURE

Medicine

Lead Poisoning by Cutaneous Absorption from Lead Dressings. Kennedy, C. C. and Lynas, H. A.: *Lancet*, **257:** 650, 1949.

Poisoning from cutaneous absorption of non-volatile lead compounds is admittedly very rare, but the authors list a number of compounds from the use of which this has occurred. They include lead-containing dermatological medicaments employed on broken and inflamed skin recorded a century ago, and within the last 30 years poisoning from lead-containing cosmetics. Only 4 cases are known of poisoning from diachylon ointment (lead oleate). Both in the case of volatile (*e.g.*, tetra-ethyl lead) and non-volatile compounds damaged skin is more permeable, most rapidly by volatile compounds. It has been estimated by various observers that 1 mgm. of lead ingested daily for some months will produce poisoning, and that 10 to 20 mgm. ingested daily for several weeks will result in clinical plumbism. In the case reported by the authors a woman with exfoliative dermatitis various dressings, such as 2% Liq. plumb. subacet. fort. (B.P.), Lot. Calamin. Co., 2% Cremor Zinc. (N.W.F.) and a tar lotion which contained approximately 3% Liq. plumb. subacet. fort. were applied to the entire body surface intermittently for about 16 weeks during a seven-month period of hospitalization. It was estimated that the daily applications of inorganic lead to the exfoliating epidermis amounted to about 1,400 mgm. for 16 weeks. Toward the end of the 7-month period nausea and vomiting, colicky abdominal pain, nervousness, headache, sleeplessness and loss of appetite were complained of. Stippling of red cells was demonstrated, and the lead present in a 24-hour specimen of urine examined by the dithizone method was found to be 0.4 mgm. per litre, 4 times that which is considered to be the upper limit of normality. The "de-leading" treatment, consisting of low-calcium diet, ammonium chloride gr. 75 per diem *per os*, intramuscular administration of 50 units of parathormone daily for 5 days, was followed by a rapid fall of urinary lead, and recovery followed. Detailed records of the hæmatological findings are given.

D. E. H. CLEVELAND

Clinical Report on the Toxicity of a New Mercurial Diuretic (Thiomerin) for Subcutaneous Administration. Feinberg, A. R., Isaacs, J. H. and Boikan, W. S.: *Am. J. M. Sc.*, **218:** 298, 1949.

In an attempt to simplify the present diuretic treatment of congestive heart failure which in the past has necessitated the use of intramuscular diuretics, this relatively non-irritating mercury compound has been developed for subcutaneous use. The preparation is put up in powder form and must be mixed with an accompanying ampoule of distilled water, the resulting solution being stable for two weeks or more at room temperature and will keep if refrigerated for several months. Its toxicity in experimental animals is very much less than that of the other mercurials at present in use and in a chart shown by the authors its administration results in marked diuresis. The authors recommend the body weight be followed as an indication of dosage rather than that injections be given at regular intervals; general muscle pains with fatigue and weakness may result from too rapid depletion of the body electrolyte and water stores.

The factor of the subcutaneous route allows for self-administration by the patient or by the family with corresponding reduced cost of medical care for the chronic cardiac or patient suffering from chronic œdema of other cause. G. A. COPPING

Erythema Nodosum. Middlemiss, J. H.: *Brit. J. Rad.*, **22:** 375, 1949.

It is now generally agreed that erythema nodosum is the result of a non-specific reaction to various infections and toxic agents and occurs most commonly in association with primary tuberculous infection. However, all patients with erythema nodosum do not exhibit a positive tuberculin reaction and the condition frequently occurs in patients known to have been infected with tubercle previously. The author has carried out a clinical and radiological investigation of 124 cases of erythema nodosum which he observed over periods varying from 4 to 48 months. He describes the local lesions, emphasizing the significance of the "play-of-colours" appearance, and the constitutional changes. Other etiological factors, such as rheumatism and associated carditis, the use of sulfonamides, sarcoidosis and fungus infection are discussed. Erythema nodosum is most common in females and in the younger age group. There is probably a seasonal incidence but an epidemic was not encountered.

Fifty-five cases (44%) showing radiological changes consistent with pulmonary tuberculosis and having a positive tuberculin reaction were regarded as being definitely causally related to tuberculosis. In 49 of these the pulmonary change was associated with a primary tuberculosis infection, and in the remainder, with pleural effusion or with the adult type of tuberculosis: 44 of the remaining 68 cases were tuberculin positive only. Twenty-two of these cases under the age of 15 years were considered as probably causally related to tuberculosis and those in the older age groups as possibly tuberculous in nature. Two of these were subsequently proved to be tuberculous. The remaining 24 cases were tuberculin negative and in four cases a culture of hæmolytic streptococci was obtained by throat swab. In eight cases the eruption followed the administration of sulfonamides and in 15 cases no definite etiological factor could be elicited.

Biopsies were carried out on the skin eruption on 20 representative examples of the various sub-groups. The histological picture was essentially the same in all cases,

the main feature being an arteriolitis. In none was acid fast bacilli demonstrated and there was no evidence to suggest a tuberculous lesion or specific etiology. A persistently negative tuberculin reaction was interpreted as excluding tuberculosis in any case and a positive reaction over the age of 15 years was considered of no great significance. Ninety-nine cases (77%) of the total cases were regarded as possibly being in some way causally related to tuberculosis. J. F. SIMPSON

Pericardial Effusion: A Constant, Early and Major Factor in the Cardiac Syndrome of Hypothyroidism (Myxœdema Heart). Kern, R. A., Solof, L. A., Snape, W. J. and Bello, C. T.: *Am. J. M. Sc.*, **217:** 609, 1949.

The authors contend that the cardiac phenomena that may occur in untreated myxœdema are not due to cardiac disease but to pericardial effusion. They demonstrate that the effusion is a constant, an early and the major factor in the cardiac findings. An occasional roentgenologist has commented on the similarity of the radiological appearance in these cases to those of pericardial effusion but the effusion was considered a rare contributing factor to the enlarged cardiac silhouette. Comparatively few instances of proved pericardial effusion in myxœdema have been reported, and in all cases, the very large cardiac shadow gave the clue to effusion and suggested a diagnostic tap. It has not been generally accepted that the effusion could largely or entirely explain the cardiac findings. In this series, pericardial effusion was proved in each of four cases. In all cases the roentgenologic findings were not suggestive of its presence, there was no evidence of congestive heart failure and the heart was slightly enlarged in only two cases. The electrocardiographic changes of myxœdema heart, hitherto ascribed to myocardial change and tissue œdema, are largely caused by effusion. When the patient is under treatment, the degree of change in the tracings is related to the absorption of the fluid. This view has been suggested by previous experimental evidence and is strongly supported, in this study, by findings of marked electrocardiographic improvement between two tracings taken on the same day just before and after the aspiration of the pericardial fluid. The effusion disappears under thyroid medication and before the metabolic rate has returned to normal.

It is difficult to diagnose pleural effusions by roentgenograms as the acute cardiac angle is not always obliterated. More significant are the faint heart sounds, feeble cardiac pulsations and the diminished apex impulse with a widened præcordial dullness. J. F. SIMPSON

Solitary Tumours of the Chest: The Differential Diagnosis in Fifty Proved Cases. Arbuckle, R. K.: *Am. J. Roentgenol.*, **62:** 52, 1949.

The number of tumours of the chest coming to the attention of roentgenologists and thoracic surgeons has increased since the beginning of mass surveys. The purpose of this study was to determine which of the diagnostic studies offer the most help in arriving at an exact diagnosis in patients who present a solitary tumour of the chest. The diagnostic aids commonly used were: (1) roentgenoscopy of the chest; (2) roentgenographic study with particular reference to bone erosion, presence of calcium, location of the mass, effect on the adjacent structures and pleural effusion; (3) bronchoscopy; (4) sputum study; (5) histopathologic examination of aspirated pleural fluid cells; (6) response to irradiation; (7) hormone assay; (8) artificial pneumothorax; (9) aspiration biopsy. Planigraphy, thoracoscopy and lipiodol bronchography were of little use in the differential diagnosis of these tumours.

The present series consisted of 50 proved solitary chest tumours. The tumours were of four types: (*a*) carcinoma of the lung (17 cases); (*b*) tumours of nerve tissue origin (11 cases); neurofibroma 9, ganglioneuroma 2; (*c*) tumours within the mediastinum (13 cases), aneurysm 5, Hodgkin's disease 3, thymoma 2, teratoma 2, lymphosarcoma 1; and (*d*) miscellaneous group (9 cases), bronchogenic cyst 2, rhabdomyosarcoma 2, fibroma 2, and one each of fibrosarcoma, mycelia of fungus and carcinoma of thyroid.

There were no roentgen findings that could be considered characteristic of any particular type of tumour. In many instances the diagnosis which was finally established was not considered among the possibilities when the first examination was made. Needle biopsy was the most prompt and accurate diagnostic procedure and was used in 31 patients, yielding a positive diagnosis in 74% of cases. This method was especially useful in pulmonary carcinoma; aspiration biopsy was performed in 15 cases and in 13 a positive result was obtained.

J. F. SIMPSON

The Reliability of the Male North American Frog (Rana pipiens) in the Diagnosis of Pregnancy. Robbins, S. L. and Parker, F.: *New England J. Med.*, **241:** 12, 1949.

The common species of North American male frog (*Rana pipiens*) was employed in 300 routine pregnancy tests on urine at the Mallory Institute of Pathology, Boston City Hospital. Results proved accurate in 96%. A single false positive was obtained and attributed to jaundice since further work showed that icteric urine gave a false positive reaction. Of twelve false negatives the majority occurred in normal pregnancies within the first month of amenorrhœa. That such false negatives were due to varying hormonal levels in individual patients, and not to insensitivity of the frog to chorionic gonadotropin, was indicated by the finding of several positive tests within four days of onset of amenorrhœa.

The use of this common, indigenous type of frog for pregnancy testing has several advantages (economical, readily accessible and easily cared for in the laboratory) over the use of other animals.

NORMAN S. SKINNER

Spontaneous Perforation of the Œsophagus. Lynch, J. B. P.: *New England J. Med.*, **241:** 395, 1949.

Sudden, severe epigastric pain, coming on during vomiting, should suggest spontaneous perforation of the œsophagus. Myocardial infarction may be simulated as the pain may be precordial. Previous history of œsophageal disease cannot be obtained. The symptoms are due to the sudden flooding of the mediastinum with highly irritant gastric contents. Signs of shock may be marked and the erroneous diagnosis of perforated peptic ulcer may be suggested. Subcutaneous emphysema may be evident in neck after six to twelve hours. X-ray examination is of aid in that it may show air behind the heart or in the upper mediastinum and the presence of a small pleural effusion which forms early. In the absence of treatment death is usual within forty-eight hours of onset. Diffuse mediastinal infection is infinitely more common than localized abscess formation with closure of the perforation. Treatment consists in adequate surgical drainage of the mediastinum with closure of the perforation. This must be done promptly, even in the presence of shock. Marked improvement may be evident as soon as the mediastinal pressure is relieved.

NORMAN S. SKINNER

Death Due to Cardiac Disease Following the use of Emetine Hydrochloride in Conditioned-Reflex Treatment of Chronic Alcoholism. Kattwinkel, E. E.: *New England J. Med.*, **241:** 995, 1949.

Emetine hydrochloride may cause death through its toxic effect upon the myocardium. The literature is reviewed and one such fatality is reported. The following rules are considered to be minimal requirements in the management of all alcoholics receiving conditioned-reflex treatment with emetine: an electrocardiogram should be taken before, during and one or two weeks after cessation of treatment; the total dose of emetine should not exceed ten grains in any one course; at least two months should elapse between courses if any electrocardiographic abnormalities de-

velop after treatment and the occurrence of such abnormalities during treatment call for immediate cessation of administration of the drug. Toxic symptoms should be watched for daily (diarrhœa, fatigue, dyspnœa, muscular tremors, dizziness, weakness) and if any occur the heart should be watched with great care. Increasing tachycardia with the patient at rest calls for at least temporary termination of treatment.

Emetine hydrochloride should not be administered to any patient suspected of having organic heart disease. NORMAN S. SKINNER

The Effect of Sulfanilamide on Salt and Water Excretion in Congestive Heart Failure. Schwartz, W. B.: *New England J. Med.*, **240:** 173, 1949.

A specific method for producing selective inhibition of renal tubular reabsorption of sodium from the glomerular filtrate would prove useful in the study and treatment of œdema. The renal tubules acidify the glomerular filtrate by the addition of hydrogen ions derived from carbonic acid formed in the renal tubular cells. This loss of hydrogen ions requires the absorption of base to maintain ionic equilibrium. Sulfanilamide is an inhibitor of carbonic anhydrase and its administration to dogs leads to a decrease in titratable acidity of the urine with a rise in pH. This work suggested that the disturbed acid-base balance accompanying sulfanilamide administration should cause a failure of reabsorption of fixed base from the glomerular filtrate. A continued loss of fixed base by this means might be expected to lead to diuresis in the presence of œdema.

Three patients with severe congestive heart failure and fluid retention were given four to six gm. of sulfanilamide daily, along with a diet of 2,000 calories and 300 mgm. of sodium. Digitalis was continued but no diuretics were employed. All three patients showed an increased sodium and potassium excretion occurring within the first twenty-four hours. The two patients who were able to tolerate the drug for a seven-day period maintained a daily sodium output of four to five times normal, with a corresponding weight loss from the associated fluid output. Sulfanilamide is too toxic for routine use as an inhibitor of carbonic anhydrase, an action which depends upon the presence of the free sulfonamide group in its structure. Investigation is being carried out to find a drug of this type with low toxicity suitable for clinical use.

NORMAN S. SKINNER

Surgery

Injection Treatment of Varicose Veins. Kinmonth, J. B. and Robertson, D. J.: *Brit. J. Surg.*, **36:** 294, 1949.

By injecting radio-opaque dyes into saphenous veins and into normal and varicose veins under varying conditions, studies were made in order to evaluate the methods of treatment of varicose veins. Retrograde injection of dyes at the time of high saphenous ligation showed that most of the material passed quickly via the communicating veins into the general circulation. When injections were made into normal superficial veins the dye never moved distally even when a tourniquet was used. When varicose veins were directly injected it was found that the optimal amount of fluid for injection was 1 to 1.5 c.c. Spilling over into deep veins is most likely to occur in tributaries of the short saphenous vein. The injection is most likely to remain stationary when the limb is kept immobile and horizontal. Histological sections from previously injected veins showed great damage to the intima and especially to valves by sclerosing agents, even when clinical thrombosis had not occurred.

An outline of treatment for severe varicose veins is given. High ligation at the sapheno-femoral junction is recommended, as is ligature at the knee or in the thigh when "blow-outs" are detected. Retrograde injection is not approved. The empty vein, horizontal position technique of direct injection is recommended.

BURNS PLEWES

Vascularization of the Myocardial Capillary Bed by Arterialization of the Cardiac Veins: An Experimental Study. Stenstrom, J. D.: *J. Int. Col. Surg.*, **12:** 413, 1949.

The results of operations to produce coronary sinus occlusion, anastomoses between the carotid artery and the open and closed sinus plus coronary artery ligation on 118 dogs are discussed. Coronary sinus occlusion produces hæmorrhage, degeneration and necrosis of the myocardium. Sinus arterialization has not been successful in preventing death from ligation of the main left coronary artery. Gradual reversal of circulation may be productive of success. BURNS PLEWES

The Diagnosis and Treatment of Vascular Diseases. Goetz, R. H.: *Brit. J. Surg.*, **37:** 25, 1949.

A new portable clinical plethysmograph and its use in the study of the surgical pathology of the autonomic nervous system is described. The results obtained are referable both to the blood-flow through the skin and the peripheral circulation in a strict sense. Such results are standardized and comparable from patient to patient. An accurate idea of the state of the collateral circulation may be obtained and the presence of organic disease estimated. The information obtained in the incipient stages of disease points the way to treatment, especially as to the indications for and against sympathectomy. It is pointed out that the danger to the patient's life and limb is not the deficiency of blood-flow through the muscles (intermittent claudication) but from the present or developing gangrene which is from interference to the blood-flow through the skin.

BURNS PLEWES

Some Aspects of the Development of Intrathoracic Surgery. Crafoord, C.: *Surg., Gyn. & Obst.*, **89:** 629, 1949.

In a Martin Memorial Lecture delivered before the American College of Surgeons, the Professor of Surgery at Stockholm discusses the present obstacles to the advance of pulmonary and cardiac operations. Thoracic surgeons must be well-trained general surgeons before embarking on the specialty. Teamwork with the internist, physiologist, cardiologist and radiologist is essential. The advances made in thoracic surgery have only been possible because of advances in anæsthesiology. Chemotherapy has reduced the mortality and has rendered more patients suitable for surgery. But the cardiorespiratory disturbances that complicate thoracotomy are inadequately understood.

A machine for oxygenation of the blood is described. The control and aiding of respiration is discussed. Experimental observations are detailed in the development of the problem. BURNS PLEWES

The Treatment of Malignant Obstruction of the Cardia. Allison, P. R. and Bowie, J.: *Brit. J. Surg.*, **37:** 1, 1949.

Out of 310 patients with malignant obstruction of the gastro-œsophageal junction, only 121 were fit for any surgical assistance. During this same period there were also 96 cases of peptic ulcer of the lower œsophagus, 56 cardiospasms, 1 obstruction from benign gastric ulcer, 1 large leiomyoma. Squamous cell carcinoma of the œsophagus was twice as common as peptic ulcer. Figures cannot show the relief from suffering and starvation which surgery may procure even when cure cannot be expected. Gastrostomy and jejunostomy are condemned and only add to the discomfort. Palliation is more successful by dilatation under direct vision till a Southar's tube can be passed. Radiotherapy has thus far been unsatisfactory for palliation. Surgery may succeed in removing the primary and enable the patient to swallow, or a Roux type of œsophago-jejunostomy may be used if the primary is irremovable.

For growths of the cardia the only satisfactory approach is thoraco-abdominal, and this is also true for carcinoma anywhere in the stomach if cure is to

be expected. An ample length of œsophagus above the growth must be removed. Lymphatic spread from œsophagus is mostly into posterior mediastinum, then to the glands around the cardia, cœliac axis, suprapancreatic, tracheo-bronchial and cervical glands. Spread of primary growths in the stomach wall is far beyond the visible and palpable margin and adjacent structures are involved by direct extension early.

Radical operations are described for carcinoma of the lower œsophagus and upper half of the stomach. Successful mediastinal anastomosis depends on adequately elastic arteries and should not be attempted with gross arterial degeneration. A two-week preoperative hospitalization is usual. During this period adequate nutrition, oral hygiene, transfusions and physiotherapy to mobilize the chest are emphasized. Smoking is forbidden till after operation. Anæsthesia and other details of technique are discussed.

The results of these procedures in 49 partial resections and 24 radical total gastrectomies are given. The careful examination of the pathological specimens removed is remarkable. No patient was seen so early that the growth was confined to the wall of the viscus. Only 2 cases showed no lymphatic metastases. It is suggested that carcinoma of the stomach should be treated by total gastrectomy, block dissection of lymphatics and this must entail resection of the spleen and body of the pancreas. Fifteen cases are detailed as to surgical pathology. BURNS PLEWES

Obstetrics and Gynæcology

The Period of Gestation. Knaus, H. H.: *J. Obst. & Gynæc. Brit. Emp.*, **56:** 181, 1949.

The actual span of human gestation has an average duration of 273 days. This duration is entirely independent of the length and the irregularity of the menstrual cycle. In order to avoid disastrous miscalculations of the expected date of delivery, the modern obstetrician should base his computation upon the exact figures of the menstrual cycle showing its course for at least one year preceding the pregnancy under consideration. P. J. KEARNS

A Nutritional Survey in Pregnancy with Particular Reference to Certain Hæmatological and Biochemical Findings. Hobson, W., Lewis, F. J. W. and Woodman, D.: *J. Obst. & Gynæc. Brit. Emp.*, **56:** 217, 1949.

An attempt has been made to correlate certain blood investigations, particularly the hæmoglobin, M.C.H.C., M.S.R. and protein (albumen and globulin) levels of 82 antenatal primiparæ, with carefully assessed dietary intake and with their clinical course. (*a*) No correlation could be found between iron intake and the M.C.H.C. levels, nor between any of the dietary factors and the hæmoglobin and protein levels. (*b*) The E.S.R. (Wintrobe) could only be correlated with clinical abnormalities at a correlated level of 30 mm. or over. (*c*) There appears to be some correlation between the M.C.H.C. in the mother and the low birth-weights, but the data were insufficient. P. J. KEARNS

Observations on the Decidual Reaction of the Cervix During Pregnancy. Bausch, R. G., Kaump, D. H. and Alles, R. W.: *Am. J. Obst. & Gynec.*, **58:** 777, 1949.

Decidual reactions of the cervix in pregnant women occur frequently and occasionally may account for bleeding during the early part of pregnancy and further may progress to such a degree as to produce significant bleeding at or near term.

Decidual reactions of the cervix are probably associated with the usual hormones of pregnancy and are not necessarily associated with either inflammation or endometriosis. An awareness of this reaction on the part of the obstetrician and the pathologist may enable one to evaluate these patients. There appear to be no permanent alterations of the cervix associated with this decidual reaction. ROSS MITCHELL

Ovarian Neoplasms in Children. Schafer, G. and Veprovsky, E. C.

Six cases of ovarian neoplasms in children have been reported. These occurred over a twelve-year period during which a total of 246 ovarian neoplasms were operated upon in adults and children. Four of them were benign, two malignant. The most frequent tumour encountered was the dermoid cyst. Complications such as torsion and hæmorrhage occurred in four of the six cases. The most common symptom was abdominal pain, which was present in five of the six cases. The most reliable sign was palpation of a mass on recto-abdominal examination. Unless the possibility of ovarian neoplasm is considered in the differential diagnosis of lower abdominal pain in children, the correct diagnosis will be missed. ROSS MITCHELL

The "Crush" Syndrome in Obstetrics and Gynæcology. Paxson, N. F. and Golub, L. J.: *Am. J. Obst. & Gynec.*, **58:** 544, 1949.

In a review of the maternal deaths in Philadelphia since the formation of the Maternal Mortality Committee of the County Medical Society seven maternal deaths were found which showed the "crush" syndrome with lower nephron nephrosis. An additional case of twisted ovarian cyst is included in the report. The obstetrical cases included placental abruptio, ectopic and birth trauma. Particular stress is placed on prevention of shock or its treatment by early and frequent blood transfusions. ROSS MITCHELL

Anæsthesia

The Postoperative care of Patients. Noble, A. R.: *Anesth. & Analg.*, **28:** 346, 1949.

The author stresses the increasing importance and use of the recovery room such as was first opened at the Mayo Clinic about six years ago. Common complications that occur during the postoperative period can usually be promptly and efficiently treated in the post-anæsthetic room. The establishment of preventive measures is a natural outcome of such a recovery room and the methodical application of these measures by specially taught nurses results in efficient treatment. It is important that all unconscious patients should if possible be transported to the ward in the lateral position and care taken to see that the patient's arms are not caught in door jambs.

Maintenance of the airway should be of paramount importance at all times and glottic spasm should be treated by immediate intubation and insufflation with oxygen if necessary. Pulmonary œdema will be seen rarely in well-managed recovery rooms. There are three main causes: (1) increased pulmonary venous pressure which may result from prolonged Trendelenburg position, right heart failure or introduction of excessive intravenous fluids; (2) prolonged resistance to respiration that may occur following partial respiratory obstruction; (3) transfusion reactions.

Most cases of mechanical origin occurring in patients of good physique will clear up soon after removal of the cause. It is the author's experience with a limited number of cardiac and shock patients that they do not tolerate positive pressure oxygen therapy well but do better on an ordinary B.L.B. wash with a high oxygen flow of 8 to 10 litres per minute.

Surgical shock can be curtailed greatly by judicious application of adequate replacement therapy during operation. When it does occur the recovery room is the ideal place for treatment. Pulmonary complications can be largely prevented by early drainage and suction of mucus from the pharynx. Drainage is secured by Trendelenburg and lateral positions while discrete suction of the pharynx is necessary to remove the secretions gravitated into the pharynx by the postural drainage. When the patient recovers consciousness he should be encouraged to practise deep breathing exercises and coughing after deep inhalations. F. ARTHUR H. WILKINSON

Neurology and Psychiatry

Twin Studies on Senescence. Kallmann, F. J. and Sander, G.: *Am. J. Psychiat.*, **106:** 29, 1949.

Like the many other studies by Dr. Kallmann of medical genetics pertaining to psychiatric conditions, this paper represents a carefully planned and thoroughly analyzed piece of work. It is of interest to all who are concerned with problems of ageing as well as for its implications concerning the potent influence of heredity even into the senium. A representative sample was studied of 1,602 twin index cases over 60 years of age both inside and outside of institutions in New York State. The comparisons between monozygotic and dizygotic pairs indicated the importance of heredity in the total life span, in the resistance to intellectual deterioration with ageing, and even in the number of children produced by married twins, whether male or female. However, monozygotic twins revealed twice as many instances as dizygotic twins in which one of the twins had children and the other had not, suggesting some basis for the superstition that one of identical twin brothers is doomed to sterility. The authors were inclined to explain this on a psychological rather than a biological basis. The paper presents several photographs of twins illustrating the maintenance of physical similarities among monozygotes throughout the whole of life.

W. DONALD ROSS

The Family Environment of Schizophrenic Patients. Lidz, R. W. and Lidz, T.: *Am. J. Psychiat.*, **106:** 345, 1949.

This is a study of 50 patients who became schizophrenic before the age of 21. The data concerning family environment indicate the frequency of broken homes, with a loss of a parent by death or separation, or gross incompatibility between the parents, and upbringing in a manner that was bizarre or unconventional. Only 5 of the 50 patients could be considered to have been raised in homes where both parents were stable and compatible. The paternal influence was considered as important as the maternal one. The findings do not dispute the possibility that hereditary factors may account for deviations in both parent and child, nor that harmful attitudes by the same parents during the early infancy of the child may not have been important. They tend to focus emphasis, however, on the continuously traumatic effect of an unstable home on the child's development right through adolescence. The paper has implications for a mental hygiene approach towards schizophrenia rather than the fatalistic approach taken by many physicians.

W. DONALD ROSS

Dermatology

Thephorin Ointment in Pruritic Dermatoses. D'Avanzo, C. S.: *New England J. Med.*, **241:** 741, 1949.

Since August, 1948, a number of observers have reported on the topical use of thephorin (2-methyl-9-phenyltetrahydro-1-pyridindine) in 5% strength in a carbowax ointment base in the commoner pruriginous dermatoses. There has been considerable disparity of opinions of the value of this agent from these observers, and the author was thereby stimulated to study the problem presented. His report covers 74 cases, all of whom were observed for a period before the treatment with thephorin ointment. The same observers then followed the cases during treatment for a period of several months. The cases were almost exactly divided between (1) neurodermatitis disseminata, (2) lichen chronicus simplex and (3) a miscellaneous group of chronic dermatoses associated with pruritus. Group (1) responded poorly, only 8 cases showing slight to fair improvement, 10 showed no results and the remainder became worse. In group (2) 16 showed results varying from slight to excellent improvement while 10 showed no results. In group (3) 12 were improved including 10 excellent results and 11 were not affected; 4 of the 74 patients became sensitized to the medicament, none of these appearing in group (2).

D. E. H. CLEVELAND

Geriatric Dermatoses. Lane, G. C. and Rockwood, E. M.: *New England J. Med.*, **241:** 772, 1949.

The diseases of the late age group affect many systems of the body, seldom one alone. Little attention has been paid to the manifestations of skin which participate in these disorders, which persist on account of circulatory abnormality, nutritional deficiencies and lack of proper care, and which often constitute a real neglect. In a survey of 2,000 private patients over 60 years of age it was found that senile keratosis (a precancerous dermatosis), epithelioma, seborrhœic keratosis, eczema and contact dermatitis were the most common conditions found on dermatological examination. They constituted 50% of the dermatoses exhibited. The next 5 commonest diseases were pruritus, psoriasis, seborrhœic eczema, dermatophytosis and verruca. It was a surprise to find that there were not more cases of certain diseases in the group of 200 patients: only 13 were cases of eruption due to drugs; 12 showed leukoplakia; there were two of varicose ulcer and only one of kraurosis vulvæ.

It is emphasized that senile cutaneous diseases do not develop at any particular age. In general as years pass the subcutaneous fat is lessened, the skin becomes thinner and wrinkled, losing elasticity and the colour generally may become grayish or yellowish with local variations of intensified or diminished pigmentation, with variable dryness and scaling. These changes as well as the small capillary angiomas, and other small benign tumours develop so gradually over long periods that they are usually accepted by the patient as part of the aging process. The largest group of cases was constituted of skin cancer and its precursor, keratosis senilis, forming 28.7% of the whole. The incidence was far higher in women. Treatment of cancer was usually radiation with roentgen rays or radium, desiccation or excision employed occasionally. Seborrhœic keratoses were destroyed in various ways only for cosmetic reasons. It was believed that in the eczematous disorders hypoproteinæmia was a main factor, and the associated œdema was abolished when an adequate supply of protein was assimilated. The plan of treatment, augmented by topical palliative measures, embodied assuring adequate mastication, protein-rich diet, administration of protein hydrolysates, concentrates and vitamins, correction of hypochromic anæmia and dilute hydrochloric acid with meals.

About 50% of the cases of pruritus were of the so-called senile type with no demonstrable primary lesions. A careful detailed examination was made to exclude possible causal factors such as diabetes and malignant lymphoma. Many were of the generalized type common in northern countries known as "winter itch". Treatment was often difficult. All possible external causative factors were searched for and eliminated when possible. The use of a so-called superfatted soap, less soap or perhaps no soap, and a mild emollient was used. Phenol is still considered as the best single antipruritic agent, and camphor and menthol of much use.

D. E. H. CLEVELAND

Pædiatrics

Subdural Hæmatoma and Effusion in Infants. Elvidge, A. R. and Jackson, I. J.: *Am. J. Dis. Child.*, **78:** 635, 1949.

This is a review of 55 cases, the majority of which (36) were ascribed to birth trauma. When seen early, from 1 to 5 days after birth, these infants had definite evidence of damage to the head (skull fracture, tentorial tear seen at post-mortem) and neurological signs, among which spasticity, a tense fontanel, and opisthotonos were the most frequent, an enlargement of the head marked enough to suggest hydrocephalus having been present only once at this early stage. However it was constant in the cases seen late, *i.e.*, between 13 days and 14 months after birth. Here, in addition to the nervous manifestations (seizures, spasticity, and opisthotonos, sometimes hemiparesis, nystagmus, and unequal pupils), the infants gave the picture of severe chronic illness and malnutrition. The series also includes 9 cases of

subdural hæmatoma traceable to skull trauma *after* birth; most of these were seen soon after the accident, in a state of coma, shock, and restlessness; a minority only had x-ray signs of fracture of the skull. Another group, called unclassified, would appear to belong to the "late" form of natal injury. Diagnosis rests essentially on the subdural tap by the anterior fontanelle. Both sides should be tapped, for the effusion may be bilateral even when neurological signs seem to point to one side. When supra-tentorial bleeding is suspected, a tap may also be made posteriorly through the lambdoidal suture. Pneumography should also be performed, ventricularly and subdurally. Repeated aspiration must be done while the patient's general condition is being improved, and may suffice to bring about a cure in the recent case. Trepanation and drainage are indicated when there is no membrane. In most late cases in which a cyst-like collection of xanthochromatic fluid has replaced the hæmatoma, the membrane should be removed through a wide craniotomy, for it often extends from the frontal to the occipital regions. Two survivors, treated early after birth by trepanation, were followed up for 9 and 10 years and are normal in every way; one other, one year after craniotomy, had mental retardation. Continuous closed drainage in this series has given poor results, through excessive loss of fluids, too rapid expansion of the brain, and infection. During treatment, attention must be paid to the fluid and protein balance. The authors have demonstrated an appreciable loss of protein through frequent removal of subdural fluid. Thus the condition formerly called "pachymeningitis hæmorrhagica interna" would appear to be traumatic in most (or all) infantile cases. In this connection, it is pointed out that the trauma of *normal* birth, attended as it is by moulding of the head and stretching of pial veins, should be conceived as capable of causing subdural bleeding. This is especially true in prematures.

PAUL DE BELLEFEUILLE

Reactions to Pertussis Vaccine. Toomey, J. A.: *J. Am. M. A.*, **139:** 448, 1949.

Encepholapathy Following Pertussis Vaccine Prophylaxis. Globus, J. H. and Kohn, J. L.: *J. A. M. A.*, **141:** 507, 1949.

Although Madsen in 1937 reported 2 fatal cases of reactions to pertussis vaccine, general attention was not brought to this hazard until 1948 when Byers and Moll (*J. Pediat.*, **1:** 437, 1948) reported 15 cases of encephalopathies following such injections, seen over a ten-year period. Of these 15 cases, 2 had been fatal and 8 had been left with evidence of irreversible cerebral damage; one only had had convulsions previously. One-third of the reactions had occurred after a first injection of the vaccine. Dr. Toomey of Cleveland consulted many pædiatrists on the incidence of convulsions after pertussis immunization. The results of this consultation form the first paper abstracted here. Most physicians, some of whom had made thousands of such injections to infants, reported no convulsions. Thirty-eight cases of convulsions were discovered. Of these infants, 23 recovered, 2 died after convulsions, 4 had recurrent convulsions; 4 were suffering from other diseases (otitis, tonsillitis) at the time the vaccine was given, and 5 had had convulsions previously. Allergy in the patient or in his family was found in 4 cases. The convulsions were stated to be accompanied by fever in 3 cases; some to have followed a first injection. Six different brands of pertussis vaccine were used. The author recommends that caution be used when there is a history of convulsions prior to pertussis immunization, any disease however slight at the time of injection, or a reaction to a previous dose. The second paper reports 2 additional cases. In the first, the infant, aged 9 months, became irritable and drowsy very soon after a second injection of vaccine. On the 10th day, he convulsed for several hours. After 3 months, psychic and electrocardiogram changes were noted. Six months after the injection, although he was showing progress in his behaviour, he was still having seizures every 3 or 4 days. In the second case, that of an 8-month old child, the first injection was followed by a 2-week period of fever and irritability. Soon after the second injection, given 6 weeks later, there were convulsions for one-half hour and a fever of 105° for 3 days. Coma, signs of decerebration and intra-cranial pressure persisted and caused death on the 30th day. The anatomical lesions consisted of neuronal degeneration in all regions of the brain, with collections of macrophages. These changes did not have a peri-vascular distribution. The possible causes that have been suggested for these reactions are individual hypersensitivity, bacterial pyrogen substances in the vaccine, pertussis toxin, and antigen-antibody reaction. The occurrence of convulsions after a first dose would eliminate the last-named hypothesis.

PAUL DE BELLEFEUILLE

Hypertrophic Pyloric Stenosis in Monozygous Twins. Lamy, M., Fèvre, M. and Sée, G.: *Arch. franç. de Péd.*, **6:** 57, 1949.

Case report of a pair of genuinely identical male twins who both had severe vomiting during the fourth week of life and both were operatively found to have hypertrophic pyloric stenosis. The author reviews all the published cases of this disease in twins. He quotes 15 pairs of homozygous twins (including the case reported), in 13 of which both infants were affected. The remaining 2 sets had only one child with pyloric stenosis, but in the first, it could be challenged whether the twins were identical, and in the second the "well" twin had had some vomiting which had been controlled medically. On the other hand, in 23 sets of heterozygous twins, 2 sets showed the disease in both infants, and in the remaining 21, only one child was affected. These facts would point to a genetic etiology.

PAUL DE BELLEFEUILLE

Pathology

Behaviour of Hodgkin's Disease Nodes Transplanted into the Anterior Chamber of the Rat's Eye. Hoffmann, G. T. and Rottino, A.: *Arch. Path.*, **48:** 230, 1949.

Human lymph nodes removed at operation formed the basis for this study. Thirteen of these were from patients with Hodgkin's disease, and the remaining 14 comprised various cancers and specific and non-specific lymphadenitis. Both fresh tissue and tissue culture fragments from these lymph nodes were used for transplantation into the eyes of white rats. All heterologous control tissue and Hodgkin's disease tissue transplants produced similar results. There were no "takes". Either the transplanted tissue disappeared after about a week or it was converted to acellular and avascular fibrous tissue. A marked lymphocytic reaction occurred in the iris in all cases including transplantation of normal human placenta. Its severity depended, apparently, on the extent of tissue necrosis. Homologous control transplants grew well.

The authors concluded that perhaps the rat is a poor host for heterologous transplants. They found nothing which could be interpreted as conforming to a pattern in Hodgkin's disease.

CHAS. W. JONES

Action of Iodine on Goitres Previously Treated with Thiouracil. Buno, W. and Grosso, F. O.: *Arch. Path.*, **48:** 27, 1949.

The authors report a histological study of two thyroid glands removed in two stages for exophthalmic goitre. Thiouracil alone was used as preoperative treatment before the first operation, and iodine alone was used before the second. There was a four month interval between operations. The histological appearance of the tissue removed at the first operation was that of marked hyperplasia, while the tissue removed at the second operation contained large follicles lined

by low cuboidal epithelium and possessing abundant dense colloid. These effects are shown by photomicrographs. The authors conclude from these two cases that the colloid transformation obtained with iodine following thiouracil is greater than that obtained by iodine alone. CHAS. W. JONES

Primary Alveolar Cell Tumours of the Lung. Laipply, T. C. and Fisher, C. I.: *Arch. Path.*, **48:** 107, 1949.

In the opinion of the authors primary alveolar cell carcinoma of the lung is the malignant equivalent of the usually benign "pulmonary adenomatosis". Both are considered rare neoplasms arising from the alveolar lining cells. They are usually bilateral and may be divided grossly into nodular and diffuse types. Forty-five acceptable cases reported in the literature are critically reviewed. Thirty of these were malignant and differed from benign "pulmonary adenomatosis" less in cytological characteristics of the tumour cells, than in the presence of anaplasia, invasion and the presence of metastases. There were 2 cases of "pulmonary adenomatosis" in which focal cancerous changes occurred. A lesion, similar to human "pulmonary adenomatosis" is reported in various animals, particularly in sheep, in which it is called jagziekte. Although the exact cause of the disease in animals is not known, it is considered to be infectious and possibly of viral origin. The relation to human disease is not clearly established.

The authors report 2 cases, in both of which the clinical manifestations were those of chronic pulmonary disease with failure of the right side of the heart. Case 1, a 51 year old female, was diagnosed clinically as Ayerza's disease. Autopsy revealed diffuse "pulmonary adenomatosis" with 2 nodules of invasive carcinoma. There were no metastases. Case 2, a 45 year old male, showed at autopsy the multiple nodular type of primary alveolar cell carcinoma without metastasis. Cardiac failure was considered to be the cause of death. The microscopic features of both cases are well illustrated. Right heart failure in these cases is attributed to the associated pulmonary fibrosis and vascular obliteration. GEORGE F. MEISSNER

Unusual Hamartoma of the Lung in a Newborn Infant. Jones, C. J.: *Arch. Path.*, **48:** 150, 1949.

The term "hamartoma" means according to Albrecht a tumour-like malformation which is composed of an "abnormal mixture of normal tissue components". A review of the literature revealed 132 cases of pulmonary hamartomas, all occurring in adults. The majority of these showed a predominence of cartilage and were often referred to as chondroma of the lung; others were called pulmonary hæmangiomas due to the prominence of vascular structures. The author reports the case of a premature baby girl who had respiratory difficulties after birth and died one hour later in spite of all attempts at resuscitation. Autopsy revealed a tumour-like mass occupying almost the entire upper lobe of the right lung. It was composed of a mixture of fibroblastic tissue in bundles, fetal fat, cartilage and imperfectly formed branchiolar structures. No truly neoplastic features could be demonstrated, so that it was considered to be hamartoma. This case represents the first reported instance of hamartoma before the age of 21.

GEORGE F. MEISSNER

Industrial Health

Injuries and Death from Lightning. Lynch, M. J. G. and Shorthouse, P. H.: *Lancet*, **1:** 473, 1949.

The effects of lightning and electricity on the central nervous system have been classified as follows: (1) immediate effects, consisting of shock, unconsciousness, and suspended animation; (2) secondary effects, comprising temporary nervous disorders, visual disturbances, burns, and gangrene; (3) remote effects, including various rare complications.

The authors of this article discuss these findings in the light of the work of various other investigators, and stress several points. In connection with the immediate effects they refer to the stated importance of starting artificial respiration as soon as possible. Among secondary effects are many curious psychological states occurring on or after recovery of consciousness, also hysterical manifestations of diverse forms. The remote effects necessitate careful consideration. One investigator emphasized the importance of distinguishing the neurological effects of lightning from true organic neurological diseases apparently precipitated by the shock, and from organic nervous disorders caused by factors in the accident other than the current, *e.g.*, falls. It has also been shown that arteriosclerosis may develop through repeated minor electrical injuries.

Following this review, the authors describe two cases of fatal lightning stroke, together with temporary effects in two others. These occurred when a great fork of lightning struck the pitch in the midst of a group of players during a soccer match. Details of necropsies and histological examinations are presented. In the fatal cases the outstanding features were hæmorrhages and necrosis in the pancreas, and keraunographic marks on the exterior of the body.

The effects exhibited by these cases are compared with those reported in previous literature. It is in the brain that the most vital histopathological changes have been sought, and found with varying success, by many workers. In the opinion of one investigator, "probably the blood-vessels constitute the main routes for the passages of currents through the brain, and many of the changes found at autopsy are explicable on the basis of a primary vascular lesion". Another has stated that "the abnormalities following the electric injury are characteristic for injured nerve-cells no matter what the inciting cause". MARGARET H. WILTON

Health Costs of Urban Air Pollution. Mills, C. A. and Mills-Porter, M.: *Occup. Med.*, **6:** 614, 1948.

That the polluted air of industrialized urban areas contributes directly to high death-rates from respiratory disease, is indicated by observations reported in this article. Some years ago, studies in Cincinnati and in Pittsburgh revealed the price which those cities were paying as a result of air pollution. There, death rates for pneumonia, pulmonary tuberculosis, and respiratory tract cancer were significantly and sharply higher in the dirtier industrial areas than in the cleaner residential suburbs. Males were involved much more than females. In the author's opinion, economic, housing and nutritional factors which have usually been considered responsible for these high rates, are of much less importance than air pollution. Additional surveys recently completed in Chicago, Detroit, Nashville, and Atlanta, show a fairly uniform response pattern in their observations. Details are given of the methods used and the information obtained. Tables present the findings in the different cities with regard to sootfall and death-rates. Emphasis is placed on the Chicago observations because these are based on the largest population numbers and are therefore most stable. For this city, maps are included to show the winter sootfall, the incidence of pneumonia, of pulmonary tuberculosis and of respiratory tract cancer among white males.

Based on the low rates prevailing in its clean suburbs, Chicago each year has an excess of 258 deaths from pneumonia among white males in its dirtier districts, 241 from tuberculosis and 69 from buccal and respiratory tract cancers. This means a total of 568 deaths among white males each year from these three respiratory diseases alone in excess of the death rates these diseases show in the city's cleanest districts. Although there are no statistics available as proof it is believed that non-fatal respiratory troubles are involved to an equal degree. As respiratory illnesses are responsible for approximately 70% of time lost from work, the effects of urban air pollution must be rated as an important economic factor in industrial

cities. Consideration is given to the possible rôle of tobacco smoke as a factor working with outdoor air pollution to affect the respiratory tracts of men in particular and also to that of exposure to local industrial dusts. The problem of remedial action is urgent and the authors hope that successful pollution prevention techniques will be perfected and widely put into use in the world's industrial cities.

MARGARET H. WILTON

OBITUARIES

Dr. Andrew Allan Alford of Oakville, Man., died suddenly January 16 while attending a school board meeting. Born in Oak Lake, Man., 62 years ago, he graduated in 1913 from Manitoba Medical College and has practised continuously at Oakville. He was coroner for the rural municipality of Portage la Prairie. Surviving him are his widow, four sons and three daughters.

Dr. Edward Bishop Alport, aged 61, died on December 15 in General Hospital in Regina. Born in Orillia, Ont., on December 9, 1888, he received his preliminary education in Orillia and went on to the University of Toronto, where he received his medical degree in 1910. He practised for a short time in Ontario before coming west to Regina in 1912. Dr. Alport was an active member of the cancer committee of the Saskatchewan Medical Association when, in November of 1929, the committee brought in a resolution urging the provincial government to buy radium and set up two cancer clinics. That resolution was the base for the elaborate cancer program of today. The keen interest Dr. Alport took in sports was reflected by his life membership in the Regina Tennis club and the fact that he was one of the founders and the first president of the Wascana Winter club. He was an honorary life member of the Antipa Shooting club and he also belonged to the Assiniboia club. Dr. Alport was a member of the council of the Royal College of Surgeons of Canada from 1940 to 1947. He was also a Fellow of the American College of Surgeons. He was active in Masonry having been a past master of the Wascana Lodge, and a member of the Royal Arch, the Wascana Preceptory and the Wa-Wa Shrine. He is survived by his widow, three daughters and one brother.

Dr. J. Robbins Arthur died on December 29, in Guelph, Ont. Born at Shanty Bay in 1863, he attended his home school and later Barrie High School. However, he left before completing his course and made a trip around the world as a book agent, spending some time in New Zealand and Australia. In 1881 he returned to Barrie and completed his high school course. He taught elementary school for a few years and then entered the University of Toronto where he graduated in medicine in 1891. He obtained his F.R.C.E. and L.R.C.P. from Edinburgh University and his certificate as an Eye, Ear, Nose and Throat Specialist from the University of Vienna. He was also a specialist in midwifery from the Saho Hospital for Women in London, England. A second trip was made around the world, this time as a ship's surgeon on one of the liners of the "Glen" line. Coming back to Canada, he served as an assistant to a number of doctors in the Barrie district, but in 1898 came to Collingwood where he established himself as a general practitioner and where he continued his practice for fifty years. History was one of his hobbies and in this regard, he was for several years chairman of the Nancy Committee. Early pioneer and Indian life were interesting to him, and he did much research work in an effort to make a comparison of the physical ailments of the Indians before and after the arrival of the white man. A member of All Saints' Anglican Church, he was also a life member of the Ontario Medical Association, Manitou Lodge A.F. & A.M. the Chosen Friends and a number of other organizations. He is survived by one daughter and one son.

Dr Jean-Marie Bernard, anesthésiste à l'hôpital Ste-Justine et de Verdun, est décédé le 11 janvier après une courte maladie. Il était âgé de 44 ans. Il laisse son épouse, un fils, une fille, son père, deux frères et une sœur.

Dr. Sidney Blanchard Biehn died on January 16 at his home in Mimico. He was in his 79th year and had resided in Mimico since his retirement in 1946. He was for some years Medical Health Officer and Chief Coroner for Parry Sound. His practice covered a large area in the Northern Ontario district. Born at Bright, Oxford County, he graduated from the University of Toronto in 1895. He practised for six years in Elmwood and for four years in Kitchener prior to going to Parry Sound. A member of the Liberal Association, he was active in political campaigns. He leaves his widow, three sons and one daughter.

Dr. J. A. Carruthers died Christmas morning at St. Joseph's Hospital, Little Current, in his 89th year. Born in 1861 at Binbrook, Wentworth County, he graduated in medicine from the University of Toronto. He came to Little Current in 1889, and practised until his retirement 15 years ago. Keenly interested in sports, baseball and football, he was a charter member of Little Current Curling Club. He took an active interest in civic affairs, was several times mayor, and served on council and school boards at various times. A strong Liberal, he represented the constituency at Ottawa some years ago. He was an active member of Doric Lodge 455, A.F. & A.M. until a few years ago, and was accorded a Masonic funeral. He is survived by his wife and two daughters.

Dr. James Scott Conklin, aged 77, former president of Vancouver Medical Association, died in Glen Hospital, Vancouver. He graduated from the University of Manitoba medical school in 1891. From 1892 until 1894 he sailed the Pacific as ship's doctor on the Canadian Australian line, and until he came to Vancouver in 1904 was resident physician at St. Boniface Hospital, Manitoba. He retired from practice ten years ago owing to ill health. Member of the Masonic Order, he was past master of Acacia Lodge No. 22. He is survived by two sons and a sister.

Dr. William Douglas Cruikshank, aged 65, died suddenly on February 2 at Beirut. Native of Hamilton, Ont., he had been director of public health services for the Government of Syria since the end of the Second World War but he retired in 1949 and was planning to return to Canada. A graduate of McGill in 1913, he was medical officer of the Princess Pats Canadian Light Infantry overseas in the First World War and for 20 years was on the staff of the American University at Beirut. During the Second World War he was in charge of medical services for the Government of Iraq with the rank of colonel. He is survived by his widow and three daughters.

Dr. W. V. Edwards of Roland, Manitoba, died at the age of 61 at his home on January 18. He graduated from Queen's Medical College in 1915.

Dr. Frank Elkerton, aged 64, died on January 21 at Sunnybrook Hospital, Toronto. He had been ill for several months. He had had a general medical practice in Toronto for 20 years. He was formerly head of the out patient clinic at Christie Street Hospital and on the staff of Sunnybrook Hospital and the D.V.A. Born at Harriston, he graduated in medicine from the University of Toronto in 1916. He served overseas in the First World War with the Canadian Medical Corps, and held the rank of major. He was a member of Yorkminster Baptist Church, where he sang in the choir, and also a

member of the Toronto Art Gallery, Uplands Golf Club, Academy of Medicine, Ontario Medical Association. He was interested in archery and golf and his hobby was painting in oils. He is survived by his widow and two daughters.

Dr. William A. Goldie died of cancer of the lung in Toronto on January 8. He was 76. Born in Ayr, Ont., he graduated from Galt Collegiate Institute, then from the University of Toronto in medicine in 1896. He worked with the university pathology and bacteriology departments for some years. Later he joined the university department of medicine, the staff of the Toronto General Hospital and the staff of the Hospital for Sick Children. He retired from the university staff in 1929, when he was only 56. But he continued to practice until 1947.

Dr. Goldie was six feet tall, carried himself erect as a ramrod all his life. He lost the sight of one eye as a small child, but his students said he saw more with one eye than any one else could with four.

Dr. Duncan Graham, the man Dr. Goldie recommended as the first Eaton professor of medicine, said yesterday: "He was a wonderful man. He retired when he did only to give younger men a chance for advancement".

Dr. Ray Farquharson, the present Eaton professor of medicine, said: "My last clinic as an undergraduate was with Dr. Goldie. He never seemed to care as much about giving his students technical information as he did about teaching them to think, to see, and to be able to do their job."

Dr. Goldie was a great reader of history and biography, an ardent bridge player, and a keen woodsman. Until his death he carried on a campaign to have the salmon in the Maritime Provinces protected and preserved. His last brief on the subject went to Ottawa shortly before his death. He is survived by four brothers and three sisters.

Dr. Joseph E. C. Henderson, aged 72, died on December 29 at his home in Vancouver. Born in Simcoe, Ont., he graduated from Trinity Medical College, Toronto, and entered general practice in Zephyr, Ont., in 1906, continuing there until 1916, when he joined the Canadian Army Medical Corps. He served as a captain in France and England until 1918. He practised in Drumheller, Alberta from 1922 to 1938, then in Lethbridge from 1938 to 1949. For many years Dr. Henderson was a member of South Minister United Church, Lethbridge. On retiring last September he came to Vancouver. He is survived by his widow, one son, two daughters and a sister.

Dr. J. A. Johnston, aged 86, of Tignish, died on January 4 in the Western Hospital at Alberton. He had fallen several weeks ago, fracturing a hip, and since then had been in hospital. He practised medicine for about 50 years in P.E.I. Graduating from McGill University in 1897, he practised at Emerald, P.E.I., until 1904 when he moved to Tignish. He attended Prince of Wales College and taught school at Emerald and Wellington before beginning the study of medicine. He was a charter member of the Charlottetown Council Knights of Columbus. He is survived by one son, two daughters, two brothers and two sisters.

Dr. Peter Joseph Kearns died on February 3 in the Royal Victoria Hospital, Montreal. Born in Metcalfe, Ont., he received his early education in Ontario schools and for two years studied agriculture at the Experimental Farm, Ottawa. Dr. Kearns contributed widely to medical literature and he represented his McGill department at many conferences in the United States and Canada. He was a foundation member of the Royal College of Obstetricians and Gynæcologists of the British Empire, a foundation member of the Canadian Gynæcological Travel Club, a fellow of the American College of Surgeons, and a foundation member of the Society of Obstetricians and Gynæcologists of Canada. He was also a member of the McGill Faculty Club, the Montreal Medical Chirurgical Society, the Canadian Medical Association and the Postgraduate Board of the Royal Victoria Hospital.

While a student in medicine at McGill, Dr. Kearns spent his summers as a playground supervisor in Ottawa. He was also a member of the hockey team of the medical faculty and a cornetist in the McGill Band. He was vice-president of the McGill Historical Society. Following graduation in medicine in 1921, he was appointed house surgeon at the Royal Victoria Hospital, where he remained four years. Dr. Kearns was chosen as a Canadian representative to the American College of Surgeons on hospital standardization, and travelled extensively in 1926 and 1927 visiting important medical centres of Canada and the United States. Given the Cooper Fellowship to study gynæcological pathology, Dr. Kearns went to England and Vienna in 1928, to take postgraduate study. On his return he was granted a Master of Science degree in pathology by McGill. He was then appointed to the teaching staff of McGill's Department of Obstetrics and Gynæcology. He was granted the Clara Law Fellowship for 10 successive years to allow him to establish a gynæcological pathology laboratory at the Women's Pavilion of the Royal Victoria Hospital. He directed the laboratory until his death. He is survived by his widow, two daughters, one son, a brother and four sisters.

Le **Dr J.-P.-C. Lemieux**, shérif du district de St.-François et ancien député du comté de Wolfe à la Législature provinciale, est mort dans un accident d'automobile le 18 decembre. Il laisse, outre son épouse, quatre fils, huit filles, deux frères et une sœur.

Dr. D. R. MacDonald died on January 2 at his home in Shediac. Born in Salt Springs, N.S., in 1871, he attended Pictou County Academy and graduated from Dalhousie University in 1905 and took postgraduate studies in St. George's Hospital, London, England and Rotunda Hospital, Dublin, Ireland He was in charge of the Morris Street Emergency Hospital, Halifax, after the explosion and practised in Cape Breton while with the Oxford Paper Company. He moved to Shediac in 1930. He is survived by one son and one daughter.

Dr. S. T. McEvoy, aged 49, of Wishart, a native of Ottawa who had practised medicine in Saskatchewan for nearly five years, died in hospital in Regina on December 28. He was a graduate of Queen's University, and during the Second World War served at Ottawa with the Royal Canadian Army Medical Corps.

Lieut.-Col. Lamont Patterson, O.B.E., died on January 12, at the age of 79 years, at his home in St. John's, Nfld. During the first World War he served with the Royal Newfoundland Regiment and became Deputy Director of Medical Services with the rank of Lieut.-Col. For his outstanding work he was honoured by His Majesty The King, and became an Officer of the British Empire. Following the cessation of hostilities he became actively associated with the Great War Veterans Association, and was President of the Dominion Command. Dr. Patterson was associated with the Reid Newfoundland Company for many years as medical adviser. His death, after a prolonged illness, was a severe loss to the whole community.

Dr J. A. Poirier est décédé subitement le 29 décembre à S.-Chrysostome à l'âge de 77 ans. Il laisse son épouse, cinq fils, six filles et une sœur.

Dr Arthur Trudeau est décédé récemment à Montréal à l'âge de 81 ans. Il laisse son épouse, deux fils et deux filles.

NEWS ITEMS

Alberta

Dr. J. W. Richardson of Calgary was elected President of the Council of the College of Physicians and Surgeons of Alberta. Dr. D. N. McCharles of Medicine Hat was made vice-president. Other members of the Council being Dr. M. Young, of Lamont; Dr. J. D. Nevill, of Camrose; Dr. A. A. Haig, of Lethbridge; Dr. E. F. Donald, of Edmonton, and Dr. F. H. Coppock, of Eckville.

When the University of Alberta Medical School was founded five money prizes were donated to the various students by the College of Physicians and Surgeons; these prizes have been awarded for the past thirty years. At the recent Council meeting the above procedure will be changed to the following selection and in the form of a scholarship of two hundred dollars, there being six such scholarships: (1) general proficiency in the first year, scholarship tenable in the second year; (2) first year anatomy, tenable in the second year; (3) first and second year physiology and pharmacology, tenable in the third year; (4) first and second year biochemistry, tenable in the third year; (5) first, second and third year pathology and bacteriology, tenable in the fourth year; (6) general proficiency in the third year, tenable in the fourth year. These scholarships are considered honour scholarships. The awards of the third and fourth years will carry with them a student-assistantship, in which case the winner of the scholarship will assist students of the pre-clinical subjects.

Dr. H. H. Hepburn of Edmonton has been appointed Professor of Surgery and Director of the Surgical Services of the University of Alberta following the passing of Dr. Fulton Gillespie. Dr. Hepburn will hold the Professorship for the remaining University term and until the fall, at which time a further appointment will be made only because of the age limit of such appointments.

The Alberta Chapter of the American College of Surgeons was held in Edmonton in January; 28 Fellows were present. Surgical convention papers were reviewed by Dr. Walter MacKenzie and Dr. Walter Anderson. Dr. A. R. Munroe gave an outline of the history of the College and the founding of the Edmonton Chapter. Dr. Roy L. Anderson the President of the Chapter was in the chair. Plans were made for future gatherings.

The medical curling rinks are in full swing in the Alberta cities and larger towns at this time. A number of doctors will be found in the rink if not in his office during these fine "Scotch days" for curling.

W. CARLETON WHITESIDE

British Columbia

The Rehabilitation Centre on West 25th Ave., in Vancouver, of which the first unit was opened in January, 1949, is being added to by the construction of a new wing. This will cost some $100,000, and will include a remedial pool, Hubbard tank, additional physiotherapy facilities, and administration offices.

The new Crease Clinic of Psychological Medicine at Essondale is also being further equipped, and expanded. The operating room is being equipped for both general and neuro-surgery. New equipment for recreational therapy is being added.

Dr. W. R. S. Wilson, of Vancouver, has been awarded a federal bursary, which will enable him to take special courses in mental hygiene and psychiatry at the University of Toronto. On completion of this course he will return to the mental hygiene division of the Metropolitan Health Committee of Greater Vancouver.

The steady increase in old-age pensions is causing some concern in British Columbia, where with a population of a million, there are now 29,000 old-age pensioners. Each one of these receives free medical and hospital care in addition to his or her pension—and the cost is increasing steadily. In addition to these, are mothers' pension recipients and social assistance cases, and these too receive medical service.

The British Columbia Hospitals Insurance Commission has a new head, in place of Dr. J. M. Hershey, former Commissioner, who resigned recently. The new Commissioner is Mr. Lloyd F. Detwiler, who was till recently sales tax Commissioner for British Columbia and was signally successful in that position.

Two nurses of the Department of Indian Affairs, Miss Bond and Miss Wilson, have received special commendation from Premier Byron Johnson of British Columbia, and Dr. G. F. Amyot, Deputy Minister of Health for the Province. They were engaged in battling a diphtheria epidemic in the Indian reservation of Stoney River, B.C., over Christmas and New Year. There were 35 cases, of whom five died, a small proportion under the circumstances. The nurses, working under desperately hard winter conditions, and living for three weeks in most primitive surroundings, used horseback, sleighs, planes and snowshoes to get about this very difficult territory. They had to forage for food, even having to catch rabbits and eat hardtack. Dr. Amyot rightly calls this action of these nurses, service "beyond the call of duty".

A new $350,000 unit is being added to the Provincial School for the Deaf and Blind in Vancouver. This will provide new teaching facilities for the handicapped children.

The new Tuberculosis Hospital in South Vancouver will go ahead this year, and will provide very badly needed accommodation for cases of tuberculosis.

The West Coast General Hospital at Port Alberni ends 1949 with a surplus of some $1,517. New wage increases have been granted to personnel, and new x-ray equipment is being installed.

A tragic fire at St. Mary's Hospital in Dawson, Y.T., early in January, cost the life of Sister Mary Gideon, who was trapped in the infirmary. The hospital was also destroyed. Seventy-seven patients were evacuated. The temperature at the time was 40 below zero, and this made fire-fighting very difficult. Sister Mary Gideon had served in St. Mary's Hospital for fifty years.

J. H. MACDERMOT

Manitoba

The new $62,000 Red Cross Hospital at Arborg was opened on January 13, in a brief ceremony. Construction of the building was financed by the Red Cross, the Manitoba Government and the community of Arborg. The one and one-half storey building contains an emergency operating room, labour room, eight beds and four bassinets. It will serve a population of 8,000.

Radio-active iodine (1-131) supplied by the Canadian atomic energy plant at Chalk River, Ont., is being used by University of Manitoba Medical College professors on patients at the Winnipeg General Hospital. Its chief value is to measure the amount of iodine consumed by the thyroid gland. The work is financed jointly by the University of Manitoba and the National Research Council.

Dr. Merle Patterson, who for more than five years has been a Woman's Missionary Society missionary in Banswara, Rajasthan, India, is home in Winnipeg on furlough. At Banswara she is superintendent of a 75-bed hospital.

Dr. P. E. Moore, Ottawa, director of Indian and Eskimo health services, arrived in Winnipeg on January 9. He will be in the city for several days in connection with the 60-bed Indian hospital to be erected at Norway House this summer. It will be designed to care for tuberculosis, surgical, medical and obstetrical cases. It will also have an isolation wing for infectious cases. Dr. Moore states that the department is getting wonderful co-operation from the Indians who have lost their fear of hospitalization.

Dr. Dwight Parkinson, graduate of McGill University with three years' postgraduate work with the Mayo Foundation, has begun practice in neurosurgery in association with Dr. Oliver S. Waugh and Dr. Hugh Cameron, Medical Arts Building.

Dr. Norman Sloan, M.D., Man. 1942, has recently been awarded the degree of Master of Science by the postgraduate faculty of studies of McGill University where he studied under Dr. Wilder Penfield. At present he is continuing research in New York.

Dr. William Thomas Dingle, director of the Forlong Memorial Cancer Therapy Department of the Winnipeg General Hospital, with Dr. Glen Stoddart, Ottawa Civic Hospital, has been selected as British Empire Cancer campaign exchange fellow for 1950-51.

ROSS MITCHELL

New Brunswick

Dr. R. R. Prosser, has been appointed director of the department of mental health. Hon. Dr. F. A. McGrand provincial minister of health, announced that this new department would begin to function at once, aided by federal grants to the Health Department. Dr. Prosser is a Nova Scotian and a graduate of Acadia and Edinburgh Universities. He is a diplomat in psychiatry from Edinburgh and is certified in psychiatry by the Royal College of Physicians and Surgeons of Canada, and has had a great deal of experience in his specialty. He served with the R.A.M.C. in the second World War and returned with the rank of Colonel.

Dr. C. C. Baird has been elected president of the Chipman Chamber of Commerce.

Dr. Alex McLennan was recently elected to the Municipal Council of Campbellton.

Dr. L. M. Veniot, of Bathurst, and Dr. Ralph P. Myers of Moncton are studying cancer subjects at the Cancer Memorial Hospital, New York on grants from the N.B. division of the Canadian Cancer Society.

Dr. Wm. V. Cone, of the Montreal Neurological Institute was a visitor to New Brunswick in January. He spoke to the Medical Societies of Moncton, St. Croix and Saint John. His discussion of neurological problems especially herniation of the intervertebral disc was most timely and interesting. Large turnouts of physicians at all these meetings indicated the widespread interest in the subject discussed as well as the large number of personal friends Dr. Cone has made in this province.

At the January meeting of the Municipal Council of Saint John, approval was given for the building of a new nurses' home and a new surgical ward at the Saint John Tuberculosis Hospital. Concentration of chest surgery for the entire province at Saint John, has been the chief factor in the need for the new surgical wards. Dr. R. J. Collins, superintendent has organized a most competent surgical group at the East Saint John Hospital. The work of this group has contributed much to the treatment of tuberculosis in this province and the added facilities planned will widen the scope of this useful work.

Dr. G. B. Peat has been appointed to the Board of Commissioners of the Saint John General Hospital. For many years Dr. Peat was chief of the department of Obstetrics. His appointment strengthens medical representation on the board and is in keeping with Dr. Peat's long public service to the municipality and the Province of New Brunswick.

Dr. T. E. Grant, of Saint John, has been appointed to the Maritime regional committee on trauma by the American College of Surgeons.

A. S. KIRKLAND

Newfoundland

The St. John's Clinical Society plans to hold fortnightly meetings in the future. Previously the Society met once a month. At a recent meeting at the General Hospital, Drs. J. O. Fraser, R. J. Simms and J. B. Roberts, presented a most interesting medical symposium. Subjects discussed were multiple sclerosis, hypertension, and syncope.

Dr. S. Walsh and family arrived recently from Northern Ireland. Dr. Walsh has been appointed to the Staff of the Hospital for Mental and Nervous Diseases, St. John's.

Drs. G. O'Sullivan, F. J. Brennan, and McGarry, arrived recently from Ireland. They will enter general practice in Fogo, St. Albans, and Burgeo respectively.

A Federal bursary has been awarded to Dr. Joseph F. Carroll, to take a two-year postgraduate course in psychiatry at Dalhousie University. On completion of his training he will be returning to Newfoundland and resume his duties as staff psychiatrist at the Hospital for Mental and Nervous Diseases.

Nova Scotia

Dr. S. J. Shane has returned to Nova Scotia and is now on the staff of the Point Edward Hospital for Pulmonary Tuberculosis at Sydney.

Dr. J. A. Webster of Yarmouth who was at Shelburne for several years has returned to his native town and re-opened his office at 563 Main Street occupied by his father and grandfather before him. Dr. Webster was made a Fellow of the American College of Surgeons at its last Clinical Congress in Chicago.

Dr. C. F. O'Reilly, until recently on the staff of the Roseway Hospital, Shelburne, has recently moved to Charlottetown, Prince Edward Island.

H. L. SCAMMELL

Ontario

The Department of Ophthalmology in the University of Toronto has received a grant from the Ontario Provincial Department of Health through funds provided by federal grant for research work on the prevention of blindness from glaucoma. This will be done under the direction of Dr. T. H. Hodgson in the Banting Institute, Toronto General Hospital and other University teaching hospitals in Toronto. The initial grant was $8,200. It is proposed that the research work will extend over 3 to 5 years.

Dr. Gordon Murray of Toronto recently lectured at the Buffalo Club, Buffalo, New York on Rheumatic Heart Disease. He gave the Eastman Memorial Lecture at Rochester, N.Y. on Cardiac Surgery.

The organizational meeting of the medical advisory committee of the Canadian Foundation for Poliomyelitis, attended by doctors from all parts of Canada was held in Toronto. Dr. W. T. Mustard of Toronto was elected president and Dr. J. C. Favreau of Montreal, secretary. Funds will be set aside each year to provide fellowships and scholarships to train physiotherapists and give post-graduate training to young doctors wishing to specialize in poliomyelitis research and treatment. Physiotherapy departments of hospitals will be aided and equipped and the economic rehabilitation of poliomyelitis victims will be undertaken.

The Ontario Government has given the Red Cross Hospital at Atikokan, in the northwestern part of the province a grant of $18,500 toward the construction of a new hospital which will have 13 beds and six bassinettes.

The Bobier Convalescent Home at Dutton has been opened. A three-storey brick residence was remodelled into a 15-bed convalescent hospital. This was bequeathed to Dutton and Dunwich Township by the late Edward Bobier with the stipulation that it be used for the sick and infirm. The people of Dutton and Dunwich subscribed more than 60% of the funds required to remodel and equip the hospital.

The Women's Committee of the Toronto Branch of the Canadian Cancer Society has opened the Little Red Door, the first cancer information centre in Canada, at 809 Yonge St., Toronto. A graduate nurse, Miss Ruth Cameron is on duty to answer questions about cancer. She will talk over people's worries about themselves or their families, give them all the information available and tell them about clinics and treatment.

The Physiological Society of the University of Toronto has been addressed by Dr. W. J. Linghorne on Studies on the Regeneration of the Supporting Structures of the Teeth; by Mr. V. B. Brooks on Electrical Responses of the Isolated Frog Brain under Various Metabolic Conditions; by Dr. C. H. Best on One month on Modern Medical Safari when he told of the trip he and Mrs. Best made to Africa. He gave lectures at the South African Universities and studied the dietary problems of the country. Infant mortality among the native population is 500 per 1,000 births. Small children suffer from deficiency diseases. Adults are badly infected with malaria, syphilis and bilharzia with consequently diseased livers. Health conditions among the natives are being slowly improved. The coloured slides illustrating his talk showed a dry, vast country abounding in game, antelope, zebras, hippotamuses and lions.

Dr. Hans Selye, director of experimental research, University of Montreal addressed the Toronto Academy of Medicine on Stress syndrome, the rôle of the kidney and adrenals in the production of hypertension, heart disease and arthritis. He had a large and attentive audience who appreciated his clear exposition.

Dr. Gavin Miller, Professor of Surgery, McGill University addressed Essex County Medical Society on Present Surgical Trends in Treatment of Colon and Rectum.

Mr. Gordon Fraser, K.C., addressed the Obstetrical and Gynæcological group of the Essex County Medical Society on Forensic Medicine at the February meeting held at the home of Dr. and Mrs. Murray Douglas, Windsor.

LILLIAN A. CHASE

The federal health department has approved a grant of $170,666 for St. Michael's Hospital, Toronto. This hospital is adding a seven storey wing to contain 139 adult beds, a 50 cubicle nursery and service departments. This will increase the capacity to more than 800 beds.

The Building Fund for the new Auditorium of the Academy of Medicine, Toronto, has now reached the level of $120,000; this sum has been subscribed by Fellows of the Academy.

The Essex County Medical Society have elected the following officers for 1950. Honorary President, Dr. A. H. C. Trottier; Past President Dr. R. E. Holmes; President, Dr. Neil MacDonald; Vice-president Dr. G. A. McTague; Secretary, Dr. J. Gorman; Treasurer, Dr. M. S. Douglas; Members, Drs. D. W. Clare, C. George, B. Duborsky and W. R. Wadell. A business meeting will be held at Grace Hospital on January 10, 1950.

At Campbellford a new 43-bed hospital is being completed to provide medical, surgical and obstetrical care for about 1,200 people in Campbellford, Hastings, Marmora and surrounding districts. A grant of $43,666 is being made by the federal health department.

The Hotel Dieu Hospital, Kingston, operated by the Religious Hospitallers of St. Joseph, is adding a new five storey wing and making extensive alterations to its present building to provide space for an additional 61 beds. This hospital is receiving a grant of $61,000 from the federal health department.

The Barrie and District Memorial Hospital Fund received a contribution of $152,000 from Mr. William H. Wright. This brings his contribution to the fund to $192,000. An extension costing $500,000 will add 50 beds to the 61 year old Royal Victoria Hospital. The Barrie and District Memorial Hospital will be an adjoining unit of the Royal Victoria Hospital.

The McKellar General Hospital, Fort William, and Victoria Hospital, London, have both been granted assistance in enlarging their present accommodation. At Fort William a quonset hut has been set up to provide accommodation for 26 patients. The federal government is matching the provincial grant of $15,844 toward the cost of this work. This is the second grant to this hospital, an earlier one of about $4,500 having been made this year toward cost of adding accommodation for the care of chronically-ill and incurable patients. A second grant of $3,750 has been authorized for Victoria Hospital, London, to help meet costs of converting obsolete washrooms, etc., into space for additional beds. Earlier this year a grant of $63,000 was made toward the cost of adding space for 63 additional beds.

Dr. William J. Deadman was chosen "Citizen of the Year" at Hamilton, Ont., in recognition of his outstanding work in setting up blood banks in that city. He received the annual gold medal presented at the civic night of the Advertising and Sales Club. Dr. Deadman is well known for his medico-legal work.

The federal health department has approved a grant of $143,000 for the Guelph General Hospital where the present building is to be renovated and converted into a 52-bed hospital for the treatment of chronically-ill patients. A new section is to be added for active treatment of medical, surgical and obstetrical cases. It will have space for 146 beds and 39 bassinets, an increase of 65 beds over the present accommodation. This hospital serves about 55,000 people in Guelph, Acton, Georgetown, Fergus and surounding townships. Construction will not be completed until the spring of 1951.

Dr. Sidney Alexander Portis, Associate Professor of Medicine, Rush Medical College, Chicago, gave a lecture at the University of Toronto on January 23, 1950. His subject was "Newer Concepts in the Etiology and Treatment of Ulcerative Colitis".

Dr. Armand Frappier, M.D., F.R.S.C., O.B.E., Director of the Institute of Microbiology and Hygiene; Director, School of Hygiene, University of Montreal addressed the Section of Preventive Medicine and Hygiene of the Academy of Medicine, Toronto, on January 26, 1950. He reviewed the experience with BCG Vaccine in the Province of Quebec.

A grant of more than $69,300 has been authorized by the federal health department for the new General Hospital at Port Colborne. To be completed this spring, it will have 62 beds and a 22-bassinet nursery.

The Hospital for Sick Children and Toronto Western Hospital gave a very successful course to nearly 60 doctors interested in problems of medical practice on January 26, 27 and 28. Bedside clinics and panel discussions in pædiatrics, medicine, surgery and obstetrics were held. NOBLE SHARPE

Quebec

Le 20 décembre dernier on procéda aux élections de la Société médicale de Montréal à l'Hôpital St-Luc. Voici le conseil pour 1950: Président, Dr Origène Dufresne; ler vice-président, Dr Paul-René Archambault; 2ème vice-président, Dr Albert Bertrand, conseiller, Dr Albert Jutras; sérétaire-général, Dr Paul Robert; trésorier, Dr René Rolland; sécrétaire des séances, Dr Pierre Marion.

Le Docteur Roger Dufresne a été nommé professeur titulaire de Médecine et de Thérapeutique à l'Université de Montréal. Le Docteur Jean-Léon Desrocher, attaché à l'Hôtel-Dieu et à l'Hôpital Ste-Justine a été élu au poste de professeur agrégé en Neurologie au même endroit.

Le Congrès de l'Association Canadienne des Radiologistes a eu lieu au début de janvier à Montréal, sous la présidence du Dr E. M. Spencer de Saskatoon.

Une nouvelle clinique du Rhumatisme a été fondée à l'Hôpital Notre-Dame au début de janvier. Le directeur en est le Docteur Jean-Marie Beauregard. Ce dernier revient d'un voyage d'études aux Etats-Unis et en France.

Le Collège Royal du Canada a fait connaître les noms de ceux qui ont obtenu leur certificat de spécialiste après avoir passé les examens avec succès. En chirurgie, les docteurs Germain Bigué, Conrad St-Jean, Jules Lavoie, J. Marceau; en ophtamologie, les docteurs Gaston Duclos, Roland Cloutier, René Charbonneau, Michel Mathieu; et le Docteur Jean-Paul Jean en électroradiologie. YVES PRÉVOST

Saskatchewan

The Annual Meeting of the Council of the College of Physicians and Surgeons of Saskatchewan was held at the Bessborough Hotel in Saskatoon on January 15. The members of Council for 1950 are Dr. F. D. Sutherland, Tisdale; Dr. J. J. Hamelin, North Battleford; Dr. J. F. C. Anderson, Saskatoon; Dr. C. J. Houston, Yorkton; Dr. C. T. Wolan, Swift Current; Dr. H. Gordon Young, Moose Jaw; Dr. E. A. McCusker, M.P., Regina; Dr. J. E. McGillivray, Weyburn; and Dr. A. J. McDougal, Indian Head. Officers for 1950 were elected as follows: President, Dr. E. A. McCusker, M.P.; First Vice-president, Dr. J. E. McGillivray; and Second Vice-president, Dr. H. Gordon Young.

Having practised medicine in Saskatchewan for forty years, the following were elected to receive Senior Life Membership in the College at the 1950 Annual General Meeting: Dr. T. H. Argue, Regina; Dr. R. O. Davison, Weyburn; Dr. E. T. French, Sr., Regina; Dr. D. C. Hart, Regina; Dr. M. I. Humphries, Prince Albert; Dr. S. E. Moore, Regina; Dr. E. T. W. Myers, Rosetown; Dr. A. MacDonald, Regina; Dr. A. B. MacKenzie, Saskatoon and Dr. R. J. McEwen, Saskatoon.

The Central Health Services Committee met on January 29, in Saskatoon to consider the work of the Canadian Arthritis and Rheumatism Society and the Crippled Children's Program in this Province. The rest of the day was spent in debate on the problems of a health insurance scheme. A very excellent meeting was had and about 29 members from all parts of the Province were present.

Dr. E. A. Frejd, formerly with the Humphries Clinic at Prince Albert, has taken up practice at Victoria, B.C.

The following doctors have left recently to take up postgraduate work: Dr. J. K. A. Clokie, Val Marie, to Vancouver General Hospital; Dr. W. G. Hemenway, Porcupine Plains, to Cook County Hospital in Chicago; and Dr. E. H. Schmidt, Regina, to St. Vincent's Hospital, Toledo, Ohio.

Dr. J. Gordon McFetridge and Dr. N. S. H. Smith have recently joined the Staff of the Medical Arts Clinic in Regina in the Surgical and Medical Sections respectively. Both Dr. McFetridge and Dr. Smith practised in Winnipeg prior to coming to Saskatchewan.
G. G. FERGUSON

General

Dr. E. L. Margetts has been appointed as Representative for Canada in the History of Psychiatry at the International Congress of Psychiatry to be held in Paris in September, 1950. He is attempting to gather together all the information, documents, pictures, etc., relative to the historical aspects of Canadian psychiatry and would welcome any interesting material that our readers could contribute. Address Dr. Margetts at the Allan Memorial Institute, 1025 Pine Ave. W., Montreal, Que.

The American Psychosomatic Society will hold its Seventh Annual Meeting at Chalfonte-Haddon Hall in Atlantic City, New Jersey, on Saturday, April 29, 1950. There will be no registration fee for members of the Society. Non-members will be admitted to the meeting for a fee of $5.00. Students, interns, residents, fellows, and those in full-time academic positions will be asked to pay a fee of $1.00 Should any further information be required, please communicate with the Society office at 714 Madison Avenue, New York 21, N.Y. Sydney G. Margolin, M.D., Secretary-Treasurer.

The American Association for Cleft Palate Rehabilitation will convene for its annual business and professional meeting on Friday and Saturday, April 28 and 29 at the LaSalle Hotel in Chicago, Ill. Any person interested in any area of the field of rehabilitation of the cleft palate person is invited to attend. The convention fee is three dollars for persons who are not members of the American Association for Cleft Palate Rehabilitation.

The American Goitre Association will meet in the Shamrock Hotel, Houston, Texas, March 9, 10 and 11, 1950. The program for the three day meeting will consist of papers dealing with goitre and other diseases of the thyroid gland, dry clinics and demonstrations.

British Empire Cancer Campaign Exchange Fellowships 1950-51. The Board of Directors of the National Cancer Institute of Canada has announced that Dr. William Thomas Dingle, Winnipeg General Hospital, and Dr. Thomas Glen Stoddart, Ottawa Civic Hospital, have been selected as British Empire Cancer Campaign Exchange Fellows for 1950-51. Drs. Dingle and Stoddart are both radiotherapists and during the tenure of their Fellowships will study present methods of radiotherapy in Great Britain.

The British Empire Cancer Campaign Exchange Fellowships were first established in 1949. Two Fellowships a year are available to Canadians on an exchange basis with the official agency in England concerned with cancer. These Fellowships afford opportunities for advanced training and experience in Great Britain in

specialized fields of investigation pertaining to the problem of cancer and are offered to Canadians interested in the clinical and allied sciences or in fundamental research. Dr. Clifford L. Ash of the Department of Radiology and Ontario Institute of Radiotherapy, Toronto General Hospital, Toronto, and Dr. Jean Michon of the Department of Radiology, Notre Dame Hospital, Montreal, were the first two incumbents of these Fellowships and are presently pursuing their studies in Great Britain.

The Grocers' Company of London, England, announce a scholarship plan for the encouragement of original medical research. A scholarship is offered each year, tenable for two years, with a value of £350 for the first year and £400 for the second year. No subject which does not come under the category of an inquiry into the Causation, Prevention or Treatment of Disease will be considered admissible. For further details apply to the Clerk of the Grocers' Company, Grocers' Hall, London, E.C.2.

Dr. Leonard O. Bradley of Toronto has been appointed Executive Secretary of the Canadian Hospital Council to succeed Dr. Harvey Agnew who has resigned from the Council to enter the field of hospital consulting. Dr. Bradley will assume his new duties August 1, 1950. He is at present Director of Studies for the Ontario Health Survey Committee.

BOOK REVIEWS

Modern Practice in Ophthalmology 1949. Edited by H. B. Stallard, Surgeon, Moorfields, Westminster and Central Eye Hospital, London. 524 pp., illust. Butterworth & Co. (Publishers) Ltd., London, 1949.

The editor of this volume has chosen a roster of authors each well known in the field he covers in the book. The aim has been to produce a volume at once comprehensive and concise enough to fit the needs of the general practitioner and the medical student. It is felt that the Editor and his assistants have adequately succeeded in this aim. The various authors have succeeded in writing in a style rather unusual in this type of book. The material is well organized, with excellent headings, and yet a sort of running commentary has been achieved which is at once readable and most informative. The book is profusely and beautifully illustrated. Illustrations are of paramount importance, particularly in a book written for the inexpert. Not only will this be a valuable book to the student and to the general practitioner, but one may venture that even the fully trained specialist will find informative reading in it.

Modern Practice in Anæsthesia 1949. Edited by F. T. Evans, Honorary Anæsthetist, St. Bartholomew's Hospital, London. 566 pp., illust. Butterworth & Co. (Publishers) Ltd., London, 1949.

This book is a well organized, well written volume which will undoubtedly merit a place in every medical library, both personal and reference. Like many British books, *Anæsthesia* is, in general, brief and succinct, but never to the point of abruptness. The contributors who are all outstanding men in their fields write with authority. The bibliography is well chosen and not very large, and the illustrations though sparse are good. The section on physiology is a particularly fine one but the part that deals with Complications is perhaps the best. The section on Apparatus is rather sketchy but it would be difficult to deal with this subject completely without being lengthy. It is unfortunately true that the British are apt to neglect the American contributions and the Americans the British, but this book is an excellent survey of the whole subject. Although it is far from complete in many aspects it is adequate to the needs of a clinical anæsthetist for quick reference.

Atomic Medicine. Edited by C. F. Behrens, Director, Atomic Defence Division, Bureau of Medicine and Surgery, Navy Department. 416 pp., illust. $7.50. Thomas Nelson & Sons, Edinburgh, New York and Toronto, 1949.

This is an excellent analysis of the present status of medical applications and implications of atomic energy. The physical background of atomic medicine and the atom and associated physics are concisely described. Fundamental biology of ionizing radiations in small or in large amounts and in single or repeated exposures is discussed, including the effects of the atomic bomb at Hiroshima and Nagasaki. The less spectacular or commoner ill effects of repeated exposure to radiation by radiologists and clinicians is also discussed in very considerable detail, including a discussion of tolerance doses in x-ray and radium workers. The effect of radiations on the blood and blood-forming organs, radiation sickness—cause and treatment—are presented in an excellent manner.

The whole subject of radiation in relation to medicine is most excellently presented, is well illustrated and carries a large bibliography with references to research and clinical work which has been done in this field. This is a book which every physician, whether or not he be particularly interested in radiology should read.

Bronchography. E. Huizinga and G. J. Smelt, Department of Oto-Rhino-Laryngology, University of Groningen, Holland. VanGorcum & Co., Ltd. (G. A. Hak and H. J. Prakke) Publishers, Assen/Netherlands.

With the extensive use of thoracic surgery, particularly in pulmonary tuberculosis, bronchography is gradually becoming an essential method of investigation. The authors take great pains in explaining how to interpret normal and pathological bronchograms. They go into great detail in explaining the value of oblique films. They explain the value of "directed bronchoscopy" in early diagnosis of bronchial carcinoma. This book by the Groningen group will be of great help in chest and ear, nose and throat work and to anybody who is doing bronchography and would like to interpret his own films. The book has many fine reproductions of bronchograms.

Bronchologie. A. Soulas and P. Meunier-Kuhn. 653 pp., illust. Maison & Cie, Editeurs, 120, Boulevard St. Germain, Paris (VIe) 1949.

This recent textbook on endoscopic technique and the pathology of the tracheo-bronchial tree is profusely illustrated, with a clear, concise text which makes reading easy even for those with a limited knowledge of the French language. For the doctors of French Canada I would think it to be an invaluable textbook for all those interested in this specialty. The work contains a total of 650 pages and covers all the normal and abnormal anatomy likely to be encountered. Coloured drawings illustrate the lung segmentation and colour plates are used for much of the abnormal pathology. Instrumentation with the proper procedures and difficulties are fully discussed, as well as the manipulation of foreign bodies. The best recommendation for this new book is probably the statement of Chevalier Jackson in the preface! "Bronchologie, Technique Endoscopique et Pathologie Bronchique, ouvrage qui apportera une immense contribution à la litterature medicale mondiale."

Current Therapy 1949. Edited by H. F. Conn. 672 pp. $11.00. W. B. Saunders Co., Philadelphia and London; McAinsh & Co. Ltd., Toronto, 1949.

The Editor states that "in this book for the first time an attempt has been made to furnish the busy practitioner not only with the latest method of treatment but a method that has been endorsed and is currently used by a competent authority". This statement is very truthful and if it is fully appreciated that it is expected that the diagnosis be first completely established, then

this is a very valuable reference for purposes of therapy. It is very complete yet concise, well organized and easy to read. However, considering the rapid change in the field of therapy, it is likely very frequent editions will be required.

Handbook of Digestive Diseases. J. L. Kantor, late Associate in Medicine, Columbia University; Gastroenterologist and Associate Roentgenologist, Montefiore Hospital, New York; and A. M. Kasich. Lecturer in Medicine, Columbia University; Adjunct Physician, Montefiore Hospital; Assistant Visiting Physician, Bellevue Hospital, Assistant Adjunct Gastroenterologist, Lenox Hill Hospital, New York. 658 pp., illust., 2nd ed. $12.00. C. V. Mosby Co., St. Louis, Mo.; McAinsh & Co. Ltd., Toronto, 1949.

Kasich has really re-written the Handbook of Digestive Diseases and it is now presented in concise and easily readable form. He has borrowed freely from current writers and presents a generally up to date and practical approach to a wide variety of gastro-intestinal problems. It can be read with profit by general practitioners, undergraduates or medical specialists. In criticism, he fails as do so many other physicians, to discuss adequately the management of gastric ulcer. The differentiation of benign from malignant ulcer is not an easy task and is an adequate reason for hospitalization of all patients with gastric ulcer so that gastroscopic acidity, and cytologic observations can be made along with maximal medical therapy with x-ray control. In the chapter on surgical management of ulcerative colitis, he has overlooked the more recent and proved satisfactory approach of subtotal colectomy as the more definitive primary operative procedure.

Histopathology of the Skin. W. F. Lever, Instructor in Dermatology, Harvard Medical School. 449 pp., illust. $12.50. J. B. Lippincott Co., Philadelphia, London and Montreal, 1949.

This book from the pen of a recognized authority on the subject is delightful reading even for those who are not dermatologists. An introductory chapter of two pages gives very timely advice on the technique for biopsy and the limitations of histological diagnoses; very useful and necessary information indeed for those submitting skin specimens for biopsy. The following four chapters are devoted to the embryology of the skin, the histology of the skin, laboratory methods and the morphology of the mesodermal cells. The remaining fifteen chapters are concerned with the histopathology of the various skin diseases. Each subject, as it is dealt with, is prefaced by a brief but pertinent clinical description of the disease, and each chapter is completed with not too many recommended references. This very excellent book, although designed primarily for dermatologists, will be found most useful by the general pathologist who is called upon to make biopsies on dermatological specimens, and also by any clinician or student who wishes to know the nature of skin and its disorders. The illustrations are unusually good.

The Invert and His Social Adjustment. To which is added a Sequel. By Anomaly, with an introduction by R. H. Thouless. 289 pp., 2nd ed. $1.65. Baillière, Tindall & Cox, London; Macmillan Co. of Canada Ltd., 1948.

This little book, by an anonymous homosexual, is instructive and interesting. The author, for the bigger part of his life, has studied the condition in himself and in others, and has tried to analyze its causes and effects in the hope of finding a solution. He has found a solution for himself, but he does not suggest that it would be generally applicable to others. He writes openly of his life, his thoughts and his investigations with the hope "that through the agency of charitable physicians, clergymen, or other advisers this book may find its way into the hands of many persons to whom it may be a source of comfort and encouragement". It is entirely free from any psychoanalytical elaborations and reflects a sensitive, observant, analytical mind, coupled with a broad experience of life, a deep cultural background and an unusual facility for putting observations and thoughts in an easily read form. It will give the medical man a much better understanding of homosexuality than he can get from most treatises on the subject. It should be read by the medical profession and the others on whom the subject touches.

Atlas of Electrocardiography. W. Dressler, Cardiologist, Maimonides Hospital, Brooklyn; and H. Roesler, Cardiologist, Department of Medicine, Associate Professor of Radiology, Temple University Medical School and Hospital, Philadelphia. 503 pp., illust. $17.50. Charles C. Thomas, Springfield, Ill.; The Ryerson Press, Toronto, 1949.

This atlas belongs in the category of a museum as a teaching institution. The collection of electrocardiograms illustrates a great variety of abnormalities of rhythm and conduction; it also includes the more common artefacts. The interpretation of each record is pressed as far as it may advance in finding evidence of anatomical pathology or a specific aberration of function in an electrocardiogram. The authors justly emphasize the view that only by correlating the other elements of the entire clinical picture with the electrocardiogram can an adequate diagnosis be made. The value of the legends includes not only guidance in understanding these records but by virtue of their good style, they serve as examples of good electrocardiographic "language". This atlas will prove most useful for those who are learning electrocardiography with the aid of postgraduate courses and modern textbooks. In the next edition, one would expect less CF and CR leads but more V leads and augmented limb leads. The index is as it should be, a good one.

Clinical Auscultation of the Heart. S. A. Levine, Clinical Professor of Medicine, Harvard Medical School; and W. P. Harvey, Research Fellow in Medicine, Harvard Medical School. 327 pp., illust. $7.00. W. B. Saunders Co., Philadelphia and London; McAinsh & Co. Ltd., Toronto, 1949.

This book should become a part of the library of every doctor interested in better diagnosis. It offers invaluable aid to medical students and interns. The senior author is an outstanding clinician and teacher who has emphasized the value of physical diagnosis, and in this book such approach is given further emphasis. While phonocardiograms and cardiograms are used to illustrate the auscultatory findings, the authors point out that such mechanical aids are not essential for diagnosis. Following an excellent discussion of normal auscultatory findings there is a good coverage of various common irregularities and of the significant murmurs. In addition there is an interesting chapter on miscellaneous auscultatory findings including such diverse things as pericardial rub, venous hum alternans, and blood pressure sounds. While small differences of opinion on a few details might be expressed the whole book merits the greatest commendation. With the increasing tendency to rely on laboratory aids that is all too apparent throughout the profession, it is most stimulating to find an exposition which enables us to improve our methods of diagnosis, and therefore, of course, of treatment at the bedside.

Care of the Surgical Patient. J. Fine, Surgeon-in-Chief, Beth Israel Hospital. 544 pp., illust. $9.00. W. B. Saunders Co., Philadelphia and London; McAinsh & Co. Ltd., Toronto, 1949.

In his preface the author suggests that this book is intended to serve the special purposes of providing a ready guide for the over all care of the surgical patient. To achieve this he first discusses general

considerations, such as useful hints in diagnosis, fluid and electrolyte balance, nutrition, hæmorrhage, and infections. Under infections he has a very good review of the uses of the various antibiotics, and a brief summary of many of the common specific infections. He then goes on to discuss under regional and special surgery, such things as burns, neurosurgical disorders, sympathetic nervous system, and the whole realm of surgery divided anatomically. In each chapter there is a very satisfactory review of the diagnosis, any special investigation, a brief summary of the surgical treatment, and a careful and detailed preoperative and postoperative regimen. The last chapter in this section covers the various surgical procedures in children. He then reviews the problems of the endocrine diseases, and the use of hormone therapy; follows this with a chapter on medical illnesses which may complicate surgical diseases, such as anæmias, cardiac disease, diabetes, and so on. There is a chapter on clinical and laboratory methods, and a general review of preoperative and postoperative care, dealing with preparation, anæsthesia, care of wounds, and the treatment of complications. This book is a very useful review for any physician, but I think it would be of particular value in hospitals as a ready reference for surgical interns.

Fundamental Considerations in Anæsthesia. C. L. Burstein, Chief, Department of Anæsthesiology, Hospital for Special Surgery, N.Y. 153 pp., illust. $4.00. Macmillan Co., New York and Toronto, 1949.

Over the last twenty-five years anæsthesiology has progressed rapidly as a science and an art. Today the specialist in this field strives to render satisfactory narcosis with as little disturbance as possible to the normal physiological mechanisms. To help him in his endeavour, Dr. Burstein has written a monograph which tends to explain on a rational basis some of the alterations in respiratory and cardiac physiology encountered under anæsthesia, and how they may be handled. This small volume is a good beginning. The subject matter is not complete, but will serve as an excellent source for the student of anæsthesia. Much of the material covered is not found in textbooks of physiology.

The considerations dealt with are concerned for the most part with the autonomic nervous system. It is unfortunate that the action of curare on this system was not discussed, or any mention made of the reactions produced by trichlorethylene. Such subjects no doubt will be considered in future editions. For this is the type of volume which grows old quickly as new discoveries are made. It will require frequent revisions as newer concepts become established.

Hæmatology for Students and Practitioners. W. M. Fowler, Professor of Internal Medicine, University of Iowa, Iowa City. 535 pp., illust., revised 2nd ed. $8.50. Paul B. Hoeber, Inc., New York, 1949.

Recent progress in the treatment of blood disorders is reflected in the second edition of this concise yet clear discussion of these diseases. Advances recorded are the use of folic acid in various diseases, particularly sprue. The use of urethane in the treatment of leukæmia and of nitrogen mustard in the lymphomas and other conditions is considered. Many changes have been made in the chapters on multiple myeloma, infectious mononucleosis and hæmoglobinurias. The use of radiophosphorus in the treatment of polycythæmia and leukæmias is discussed. Dr. Elmer L. DeGowin has revised his chapter on "Transfusion of Whole Blood and Blood Derivatives," and has included a detailed consideration of the Rh factor and other blood groups. The text is not overburdened with philosophical discussions. Facts are set out fully but concisely. The illustrations, of which eight are in full colour, are excellent. The book will be useful to the medical student, to the general practitioner and to the internist.

Roentgen Diagnosis of the Extremities and Spine. (Annals of Roentgenology, Volume 17). A. B. Ferguson, Associate Professor, Orthopædic and Fracture Surgery, Boston University. 519 pp., illust., 2nd ed. $15.00. Paul B. Hoeber, Inc., New York, 1949.

This excellent reference book was first published in 1939. The author has not found occasion to change much of the original text except for some minor additions. This new edition as a whole, however, has become approximately 25% larger by the addition of two new chapters on bone tumours. The format is good, remaining the same as in the previous edition. The reproductions of the radiographs are still positives rather than negatives but this does not detract appreciably from the value of the book.

An Account of the Schools of Surgery, Royal College of Surgeons, Dublin 1789 to 1948. J. D. H. Widdess, Librarian and Lecturer in Biology, R.C.S.I. 107 pp., illust. $4.40. E. & S. Livingstone, Ltd., Edinburgh; Macmillan Co. of Canada, Toronto, 1949.

The House of Livingstone has here provided a book which in format, typographical detail and theme should bring joy to every student of medicine, and to the growing number of physicians who value books for their own sake. When such a book celebrates the traditions and development of a great medical institution it is doubly valuable. The Irish College of Surgeons and its Schools have a magnificent history. It has nourished men whose names are by-words in medicine. Furthermore the "Dublin School" has been rich in characters and these provide an unrivalled human interest for the historian. Dr. Widdess has risen to the occasion and given us an account in which the more solid historical matters are enlivened by biographical and social comment, and chronological data, biography and bibliography are skilfully balanced. The whole cannot fail to delight anyone who has a taste for the medical past or for the Irish genius in action. The author is a writer of first-rate quality and this volume has obviously been for him a labour of love. This is none of the wooden and dull commemorative books which are so often presented as the history of an institution.

The Royal College of Surgeons in Ireland is to be congratulated on what is a fine and living memorial in book form which must be the envy of any medical college or institution.

Plastic Surgery of the Nose. A. P. Seltzer, Associate in Otolaryngology, Graduate School of Medicine, University of Pennsylvania. 305 pp., illust. $14.00. J. B. Lippincott Co., Philadelphia, London and Montreal, 1949.

This monograph is a very comprehensive review of the various standard procedures in nasal reconstruction. The author, after reviewing the embryology, physiology and anatomy of the nose, deals, in turn, with the various plastic surgery procedures involving this organ. The standard rhinoplastic technique is described as well as submucous resection, use of various types of grafts and a description of pedicle flaps for the reconstruction of subtotal or total loss of the nose. A separate division deals with defects about the nares, both of congenital and acquired origin. There is a separate chapter on one type of repair of cleft lip, and the various difficulties encountered are described together with proposals for their management. The final chapter deals with postoperative complications and the care of patients with unsatisfactory postoperative results. The book is written in a clear, concise style which facilitates reading; the illustrations are profuse and their general character is good. This volume may be read with profit by the general surgeon who is seeking special information on the nose and related structures, as well as by the otolaryngologist and plastic surgeon.

Clinical Methods. Sir. R. Hutchison, Consulting Physician to the London Hospital and to the Hospital for Sick Children, Great Ormond Street; and D. Hunter, Physician to the London Hospital. 484 pp., illust., 12th ed. $4.50. Cassell & Co., Ltd., London, Toronto, Melbourne, Sydney and Wellington; McClelland & Stewart Ltd., Toronto, 1949.

This book has for fifty years enjoyed a considerable and deserved reputation. Students and practitioners alike will find this latest edition an excellent outline of the established methods of clinical investigation which includes the essentials of physical as well as laboratory examinations system by system. Certain relevant anatomical and physiological material has been included. Such a fundamental book should prove extremely useful in the practice of medicine.

Companion in Surgical Studies. I. Aird, Professor of Surgery in the University of London. 1060 pp. E. & S. Livingstone Ltd., Edinburgh; Macmillan Co. of Canada Ltd., Toronto, 1949.

A surgical textbook of over a thousand pages by a single author is a rarity today. Most modern texts have multiple authorship, with unevenness of style. Editors have bid for names with advertising value and the literary quality of the contributions has not always lived up to the reputation of the contributors. Professor Aird has returned to the process of Osler and of de Quervain. He has assembled the opinions and convictions of contemporary authority in general surgery and has added those things which have been missed in the greatest compendiums—scholarship and style. For the perplexed undergraduate this volume can be accepted as all that is needed for the general surgical course—and more than all. Anyone interested in teaching will delight in the pedagogical polish with which this vast amount of material has been handled. The selection of material has been masterful; the short bibliographical lists are expertly chosen. Candidates for examination for the Fellowship in Surgery of The Royal College will find in this volume a welcome answer to the quest of years for a suitable book for their needs. It is not only charmingly up-to-date, but ruthless deletions of old and useless material has rid it of much of the deadwood which encumbered similar efforts in the past. This is a well-pondered book, complete and satisfying.

Binocular Imbalance. E. Krimsky, Adjunct Professor of Ophthalmology, New York Polyclinic Medical School. 464 pp., illust. $14.10. Lea & Febiger, Philadelphia; Macmillan Co. of Canada Ltd., Toronto, 1948.

Recently several books have appeared dealing with ocular co-ordination, binocular vision, and disorders in these functions. Of these the present volume must be considered in the front rank. Like the others, in many places it shows strongly the personal bias and attitude of the author. In our present state of knowledge, or lack of knowledge, of this most complex subject, such cannot be considered a fault. Much is yet a matter of opinion. The opinions of various experts will crystallize with time into factual knowledge. The book is excellently organized and written. The illustrations are numerous and well chosen. The author very properly puts great emphasis on the many simple tests used. He puts particular stress on the corneal "light reflex". (So as not to cause confusion with "nerve reflexes" it would have been better if he had referred to this as "corneal light reflection"). These simple tests and their interpretation are dealt with so meticulously and systematically that the book is worth the purchase price for these descriptions alone. Possibly the author's bias is seen most in his discussion of the more elaborate tests and instruments, such as the stereoscope. As already pointed out, this is not cause of severe criticism. However, the writer's claims would have held more weight if he had published in statistical manner his results with controls for comparison.

Diseases of the Liver, Gallbladder and Bile Ducts. S. S. Lichtman, Assistant Professor of Clinical Medicine, Cornell University Medical College. 1135 pp., illust., 2nd ed. $20.25. Lea & Febiger, Philadelphia; Macmillan Co. of Canada Ltd., Toronto, 1949.

This excellent book has been thoroughly re-written and is well proportioned, the basic sciences being given their rightful due. Although it is a very extensive treatise one can, nevertheless, get very much of clinical and practical value from it. Reading is sometimes difficult because sentences are rather long, but it contains more "meat" than any other like volume which this reviewer has seen. The best way to use this type of book is to synopsize the sections dealing with those problems which most concern the reader. These would probably include the cirrhoses of the liver, the hepatidites, the symptoms and signs of liver disease, and the treatment of liver disease. There are also very good chapters on the liver in hyperthyroidism, in pregnancy, and in heart disease. That the liver is so intimately concerned with such conditions is often not recognized, with the result that treatment is not as thorough as it might be. The sections on the physiology, pathology and the differential diagnosis of jaundice, make for a basic understanding of this sometimes difficult diagnostic problem.

History of Oto-laryngology. R. S. Stevenson, M.D., F.R.C.S.(Edin.) and D. Guthrie, M.D., F.R.C.S(Edin.). 155 pp., illust. $4.40. E. & S. Livingstone Ltd., Edinburgh; Macmillan Co. of Canada Ltd., Toronto, 1949.

This is the first formal history of the specialty of otolaryngology to be written, and it is fitting that the author's should be two of the most distinguished living medical writers. The result is a model of concise historical narrative with a due regard for personal and clinical detail to give vital interest to the story. It is a delight to have assembled within one book material which formerly had to be sought in the pages of medical journals or in articles or chapters in books dealing with medical history. It is equally satisfying to have the records of advances in the fields of laryngology, rhinology and otology properly grouped and balanced, and the whole assessed in the perspective of medical history which the scholarship of the authors affords.

The chronicle extends from the folk-lore of ancient times to the endoscopy of today. There is much lively comment, for this specialty has great interest for the historian and is rich in dramatic and controversial values. There is an exhaustive bibliography. The volume is finely illustrated. All physicians and particularly those in the specialty herein celebrated will find this a rewarding, valuable and delightful book.

Psychological Aspects of Clinical Medicine. S. B. Hall, Honorary Psychiatrist, Liverpool Royal Infirmary. 416 pp. 21/-. H. K. Lewis & Co. Ltd., London, 1949.

This book embodies a course of lectures designed to integrate psychological and general clinical medicine more closely. The book is a good one for those to whom the terminology and concepts of psychiatry are somewhat familiar, but may prove difficult if such a background is lacking.

Year Book of Medicine 1949. Edited by Paul B. Beeson, *et al.*, 831 pp., illust. $4.50. The Year Book Publishers Inc., Chicago, Ill., 1949.

It is almost unnecessary to comment on the latest addition to this series. As usual, this Year Book of Medicine is replete with up to the minute information concerning the most recent advances in the field. This note merely serves to call attention to the fact that the 1949 edition of this series is now available.

Continued on page 31

Books Received

Continued from page 316

Books are acknowledged as received, but in some cases reviews will also be made in later issues.

Suppurations chroniques de l'oreille moyenne. R. Maduro, Oto-Rhino-Laryngologiste des Hôpitaux de Paris. 344 pp., illust. L'Expansion Scientifique Française, Paris, 1949.

Chirurgie réparatrice. R. M. d'Aubigné. 348 pp., illust. L'Expansion Scientifique Française, Paris, 1949.

Narco-analyse et narco-diagnostic. G. Heuyer, Professeur de clinique psychiatrique infantile à la Faculté de Médecine de Paris. 87 pp. L'Expansion Scientifique Française, Paris, 1949.

Tuberculoses traitées par la streptomycine. E. Bernard, Professeur à la Faculté de Médecine de Paris. 172 pp., illust. L'Expansion Scientifique Française, Paris, 1949.

Health Instruction Yearbook 1949. O. E. Byrd, Professor of Health Education, and Director, Department of Hygiene, School of Education, Stanford University. 276 pp. $3.50. Stanford University Press, Stanford, California, 1949.

Guide to Diagnosis of Occupational Diseases. Industrial Health Division, Department of National Health and Welfare, Ottawa, and the Division of Industrial Hygiene, Department of Health, Ontario. 317 pp. Obtainable from King's Printer at $1.00 per copy. Published by Authority of the Honourable Paul Martin, Minister of National Health and Welfare, Ottawa, 1949.

New Teeth for Old. V. H. Sears, formerly Professor of Prosthetic Dentistry, New York University. 80 pp. Paper bound $2.00, cloth bound $2.50. The University of Utah Press, Salt Lake City; McAinsh & Co. Ltd., Toronto; C. V. Mosby Co., St. Louis, Mo., 1949.

Ecology of Health. The New York Academy of Medicine Institute on Public Health, 1947. Edited by E. H. L. Corwin, Executive Secretary, Committee on Public Health Relations, New York Academy of Medicine. 196 pp. $2.50. The Commonwealth Fund, New York, 1949.

Selective Partial Ablation of the Frontal Cortex. Columbia-Greystone Associates, edited by F. A. Mettler. 517 pp., illust. $10.00. Paul B. Hoeber, Inc., New York, 1949.

Continued on page 54

JOURNAL OF

Canadian Medical Association

Editorial offices — 3640 University St., Montreal 2

General Secretary's office—135 St. Clair Ave. W., Toronto

Subscription rates: The Journal is supplied only to paid up members of the Canadian Medical Association with the following exceptions: for medical libraries, hospitals and doctors residing outside of Canada, the annual subscription is $10.00; for medical students residing in Canada there is a special rate of $2.50 per annum. All subscriptions and related correspondence should be addressed to the General Secretary's office at 135 St. Clair Avenue West, Toronto 5, Ontario.

Contributors: Articles are accepted on condition that they are contributed solely to this Journal. Material contributed to this Journal is covered by copyright, and permission must be obtained for its reproduction either in part or in whole.

Manuscripts must be typewritten, double spaced, and the original copy.

Papers should be kept below 4,000 words wherever possible. Whilst not necessarily a cause for rejection, excessive length of an article is undesirable.

References: in the case of a journal arrange as follows: author (JONES, A. B.), title, journal, volume, page, year. In the case of a book: WILSON, A., Practice of Medicine, Macmillan, London, 1st ed., p. 120, 1922.

Illustrations: A limited number will be accepted. Photographs should be clear: drawings should be in india ink on white paper. All unmounted. Legends to be typed separately.

Reprints: May be ordered upon forms sent with galley proofs.

News: The Editor will be glad to consider any items of news that may be sent in by readers.

Classified Advertisements

Send copy to Canadian Medical Association, 3640 University Street, Montreal, not later than the fifteenth of the month previous to issue.

Rates: $2.50 for each insertion of 40 words or less, additional words 5c each.

NOTICE.—APPLICATION FOR INTERNSHIP AT ST. LUKE HOSPITAL. St. Luke Hospital in Montreal will consider the applications of doctors requesting rotating internship through its various services. St. Luke Hospital has a capacity of 456 beds and is approved by Canadian Medical Association and also approved by the American College of Surgeons; the quarters for interns were very recently furnished and offer first rate accommodation; salary, $75.00 per month through the first year; $100.00 per month the following year. Written applications should be sent to Dr. Harold Tétreault, St. Luke Hospital, 1058 St. Denis Street, Montreal, Que.

NOTICE TO FINAL YEAR STUDENTS.—Applications for internship in St. Mary's Hospital, Montreal, for the year commencing July 1, 1950, are being received. The appointments available will be for a rotary service in Medicine, Surgery, Gynæcology-Obstetrics and Out-patient Department or Laboratory, three months being spent in each service. Interns on rotation service receive a stipend of $25 per month. Apply to the Superintendent.

POSITION VACANT.—Applications are invited for the position of Junior Medical Officer at the British Columbia Cancer Institute from June 1, 1950 to October 1, 1951. Salary according to experience. Previous training in radiotherapy is not essential but would be of value. Address applications to Medical Director, British Columbia Cancer Institute, 685 West Eleventh Avenue, Vancouver, B.C.

POSITION VACANT. — Assistant Radiologist wanted at Victoria Hospital, London, Ontario. Hospital approved for specialty training. Applications to be forwarded to the Superintendent.

POSITION VACANT.—We solicit inquiry relative to several vacancies on an active rotating intern service with excellent teaching facilities. Residencies in several specialties available following one year of internship. Salary offered is $75 per month including full maintenance plus a bonus up to $250 upon the completion of a year of satisfactory service. Apply to Box 830, Canadian Medical Association Journal, 3640 University Street, Montreal.

POSITION VACANT. — Anæsthetist wanted. Applications will be welcomed immediately from graduates of approved medical schools with experience in anæsthesia by a large teaching hospital in Montreal, Quebec. Employment permanent. Salary in accordance with experience. Maintenance if desired. Apply Box 833, Canadian Medical Association Journal, 3640 University Street, Montreal.

POSITION VACANT.—Resident anæsthetist wanted. Applications will be received from graduates of approved medical schools for residencies in the Department of Anæsthesia of a large teaching general hospital in Montreal, Quebec. A wide experience in the various techniques of all forms of anæsthesia is afforded. Appointments available immediately for periods of one or two years. Salary commensurate with previous experience. Full maintenance is provided. Apply Box 832, Canadian Medical Association Journal, 3640 University Street, Montreal.

POSITION VACANT.—Locum tenens for six months beginning June 1. General practice and surgery in industrial city in Western Ontario. Salary $400 per month. Apply, giving age, religion and experience to Box 834, Canadian Medical Association Journal, 3640 University Street, Montreal.

POSITION VACANT.—Young doctor as general assistant or a young internist in a four man group in a small interior city of British Columbia. Excellent office and hospital facilities. Apply to Box 837, Canadian Medical Association Journal, 3640 University Street, Montreal.

POSITION VACANT.—General Surgeon. Preferably one with some urological training. Wanted by Ontario group. Partnership offered to suitable applicant. Apply to Box 839, Canadian Medical Association Journal, 3640 University Street, Montreal.

POSITION VACANT. — Medical Graduate, preferably over thirty years. Interested in anæsthesiology. Wide and varied volume of work leading to Canadian Certification. Apply to Box 841, Canadian Medical Association Journal, 3640 University Street, Montreal.

Continued on Page 34

Vi terra

12 minerals and 9 vitamins } all in 1 capsule

BALANCE

The Vi terra formula provides a balanced intake of vitamins, minerals and trace elements. It is designed to enhance the nutritional benefits of each of its ingredients. The components of Vi terra are so proportioned as to insure the harmonious interrelationship that is essential for the proper functioning of the vital enzyme systems.

EFFECTIVENESS

The Vi terra formula is based on the research of hundreds of authorities on nutrition. It contains all of the vitamins known to be essential for human nutrition and the 12 minerals most commonly deficient in food.

CONVENIENCE

With Vi terra, it is possible, for the first time, to secure adequate supplementary intake of vitamins, minerals and trace elements in a single capsule.

AT A PRICE EVERY PATIENT CAN AFFORD

Study the formula

MINERALS		VITAMINS	
Cobalt (Cobaltous Sulf.)	0.1 mg.	Vitamin A (Refined Fish Liver Oil)	5,000 Int. Units
Copper (Cupric Sulfate)	1 mg.	Vitamin D (Irradiated Ergosterol)	500 Int. Units
Boron (Sodium Metaborate)	0.2 mg.	Thiamine Hydrochloride	3 mg.
Iron (Ferrous Sulfate)	10 mg.	Riboflavin	3 mg.
Iodine (Potassium Iodide)	0.15 mg.	*Pyridoxine Hydrochloride	1 mg.
Calcium (DiCalcium Phosphate)	213 mg.	Niacinamide	25 mg.
Manganese (Manganous Sulf.)	1 mg.	Ascorbic Acid	50 mg.
Magnesium (Magnesium Sulf.)	6 mg.	*Calcium Pantothenate (Dextro)	5 mg.
Molybdenum (Sodium Molybdate)	0.2 mg.	*Vitamin E (Type VI)	10 Int. Units
Phosphorus (DiCalcium Phosphate)	165 mg.		
Potassium (Potassium Sulf.)	5 mg.		
Zinc (Zinc Sulfate)	1.2 mg.		

*The significance of these vitamins in human nutrition is not yet established.

DOSAGE. Due to the catalytic-synergistic action of certain minerals with vitamins in vivo, it is suggested that one **Vi terra** capsule a day will serve adequately for supplementary nutrition. For quicker results three or more **Vi terra** capsules daily may be prescribed.

Vi terra is supplied in bottles of 100 capsules

J. B. ROERIG AND COMPANY (Canada) Limited, 256 Chilver Road, Windsor, Ontario, Canada

Books Received

Continued from page 31

The Eye and its Diseases. C. Berens, Managing Director of the Ophthalmological Foundation. 1092 pp., illust., 2nd ed. $18.50. W. B. Saunders Co., Philadelphia; McAinsh & Co. Ltd., Toronto, 1949.

Normal Values in Clinical Medicine. F. W. Sunderman, Professor of Experimental Medicine and Clinical Pathology, University of Texas Postgraduate School of Medicine; and F. Boerner, late Associate Professor of Clinical Bacteriology, Graduate School of Medicine, University of Pennsylvania. 845 pp., illust. $16.00. W. B. Saunders Co., Philadelphia; McAinsh & Co. Ltd., Toronto, 1949.

Atlas of the Blood and Bone Marrow. R. P. Custer, Director, Laboratories of the Presbyterian Hospital, Philadelphia. 321 pp., illust. $17.25. W. B. Saunders Co., Philadelphia; McAinsh & Co. Ltd., Toronto, 1949.

The Conduct of Life Assurance Examinations. E. M. Brockbank, Honorary Consulting Physician, The Royal Infirmary, Manchester. 176 pp., 3rd ed. 12/6. H. K. Lewis & Co. Ltd., London, 1949.

Sight, Light and Efficiency. H. C. Weston, Director of Group for Research in Occupational Optics and Secretary of the Vision Committee, Medical Research Council. 332 pp., illust. 42s. H. K. Lewis & Co. Ltd., London, 1949.

Money, Medicine and the Masses. A. D. G. Blanc, B.Sc., M.B., Ch.B., A.N.Z.I.C. 193 pp. 10/6. A. H. & A. W. Reed, Wellington, New Zealand, 1949.

Synopsis of Medicine. Sir H. L. Tidy, Extra Physician to H.M. The King. 1243 pp., 9th ed. $5.75. John Wright & Sons Ltd., Bristol; Macmillan Co. of Canada Ltd., Toronto, 1949.

Cum Notitia. Reminiscences of a General Medical Practitioner. D. A. Alexander, M.B., Ch.B. 395 pp. $2.40. John Wright & Sons Ltd., Bristol; Macmillan Co. of Canada Ltd., Toronto, 1949.

Electrotherapy and Actinotherapy. E. B. Clayton, Consulting Physician to the Physical Treatment Department, King's College Hospital, London. 460 pp., illust. $2.40. Baillière, Tindall & Cox, London; Macmillan Co. of Canada Ltd., Toronto, 1949.

A Twentieth Century Physician. Sir A. Hurst, D.M., F.R.C.P. 200 pp., illust. $2.85. Edward Arnold & Co., London; Macmillan Co. of Canada Ltd., Toronto, 1949.

Massage and Remedial Exercises in Medical and Surgical Conditions. N. M. Tidy, Member of the Chartered Society of Physiotherapy. 487 pp., illust., 8th ed. $4.75. John Wright & Sons Ltd., Bristol; Macmillan Co. of Canada Ltd., Toronto, 1949.

May and Worth's Diseases of the Eye. M. L. Hine, Consulting Ophthalmic Surgeons, Charing Cross Hospital and Miller General Hospital. 548 pp., illust., 10th ed. $4.30. Baillière, Tindall, & Cox, London; Macmillan Co. of Canada Ltd., Toronto, 1949.

Human Personality and its Minor Disorders. W. Harrowes, formerly Assistant Psychiatrist, Henry Phipps' Psychiatric Clinic, Johns Hopkins Hospital. 260 pp. $2.85. E. & S. Livingstone Ltd., Edinburgh; Macmillan Co. of Canada Ltd., Toronto, 1949.

Physiology in Health and Disease. C. J. Wiggers, Professor of Physiology and Director of Physiology Department in the School of Medicine of Western Reserve University, Cleveland, Ohio. 1242 pp., illust., 5th ed. $12.00. Lea & Febiger, Philadelphia; Macmillan Co. of Canada Ltd., Toronto, 1949.

Stomach Disease as Diagnosed by Gastroscopy. E. D. Palmer, Major, Medical Corps, United States Army. 200 pp., illust. $10.20. Lea & Febiger, Philadelphia; Macmillan Co. of Canada Ltd., Toronto, 1949.

The Meyers Memorial Award

The Award of $100.00 will be paid for the best thesis or dissertation on "The Study and Treatment of Functional Neuroses which if untreated, or not treated sufficiently early, might terminate in insanity". For particulars write to:

THE CANADIAN MEDICAL ASSOCIATION
135 St. Clair Ave. West, Toronto 5